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CANADIAN MACHINERY AND MANUFACTURING NEWS

A weekly newspaper devoted to the manufacturing interests, covering in a practical manner the mechanical, power, foundry and allied fields. Published by the MacLean Publishing Company, Limited, Toronto, Montreal, Winnipeg and London, Eng.

Vol. XIV

Publication Office: Toronto, October 7, 1915

No. 15

ABSOLUTE SATISFACTION

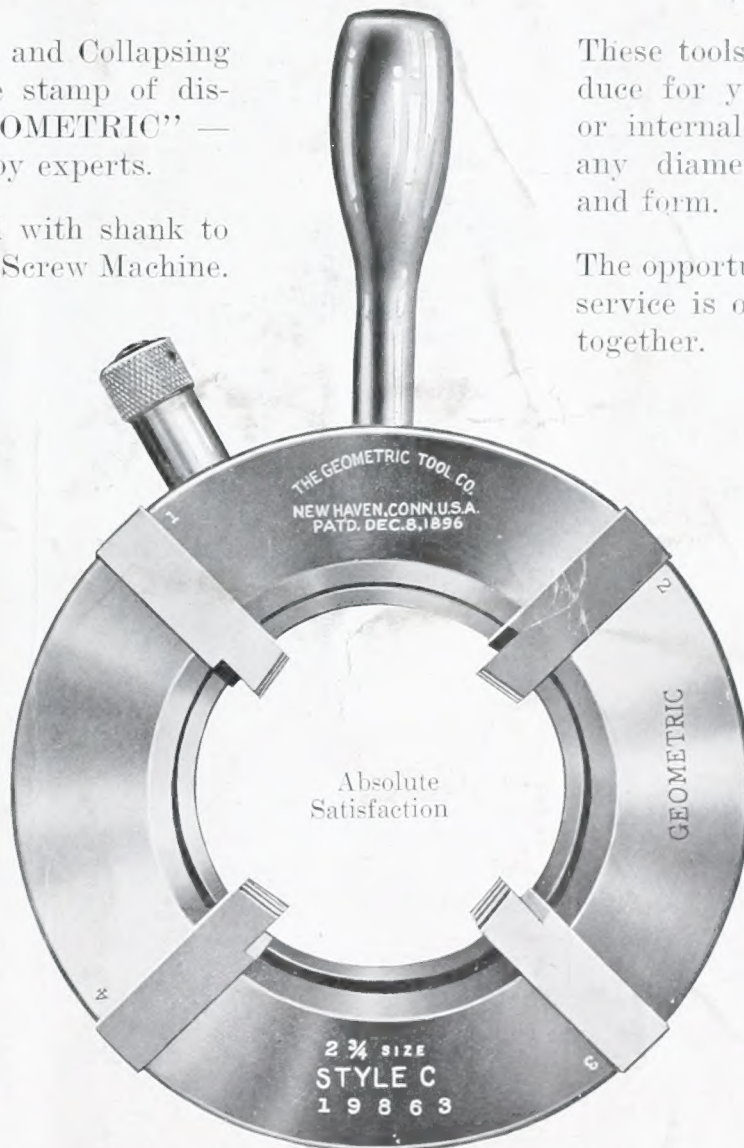
That is what we have put into our Die Heads. You can get it out of them.

Every Die Head and Collapsing Tap bearing the stamp of distinction — "GEOMETRIC" — has been tested by experts.

Can be arranged with shank to suit any make of Screw Machine.

These tools are ready to produce for you either external or internal screw threads of any diameter, length, pitch and form.

The opportunity is yours. The service is ours. Let us work together.



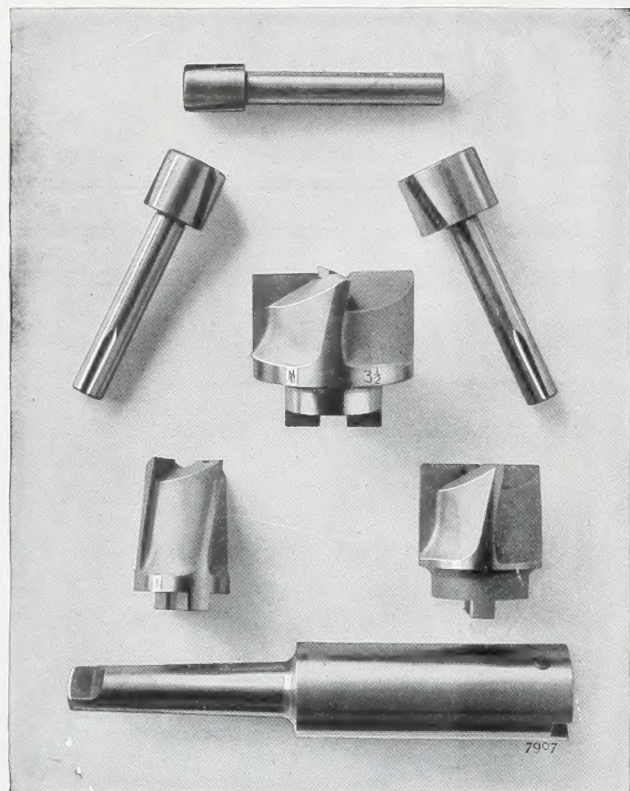
QUOTATIONS PROMPTLY GIVEN UPON RECEIPT OF SPECIFICATIONS. MAY WE HAVE YOURS?

The Geometric Tool Company, New Haven, Conn., U.S.A.

Canadian Agents:

Williams & Wilson, Ltd., Montreal; The A. R. Williams Machinery Co., Ltd., Toronto, Winnipeg and St. John, N.B.

Make Your Own Combination



For every counterboring job you can make immediately the right combination of holder, cutter and guide if your tool room is equipped with

P. & W. Interchangeable Cutter Counterbores

Holders, Cutters and Guides furnished in wide range of sizes.

Holder

End of holder is milled to receive the driving lug of the cutter and there is also a hole and set screw to accommodate the shank of the guides.

Guides

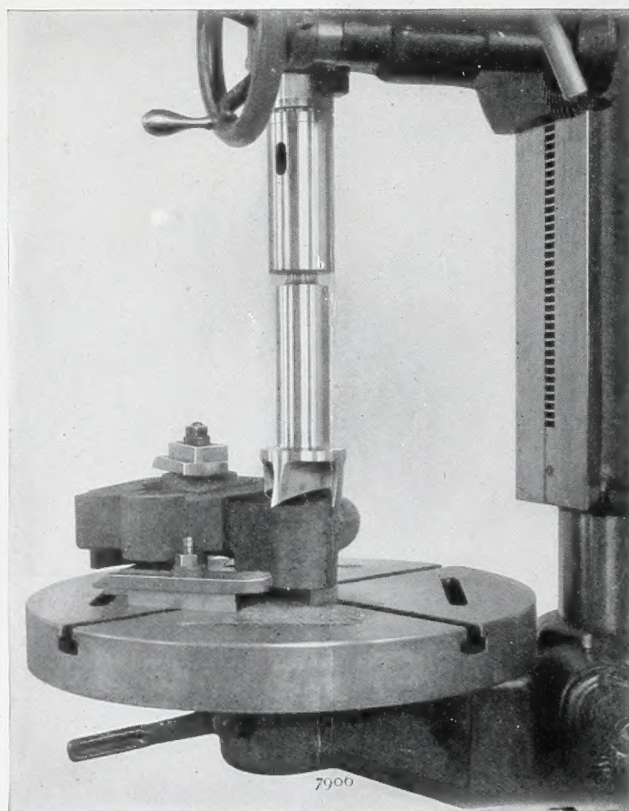
Are of hardened tool steel. They are held in place by means of a set screw in the holder engaging a V-slot in the shank of the guide.

Cutters

Can be furnished of either carbon or high speed steel.

The shank of the guide passes through the hole in the cutter and the shoulder between the guide and its shank keeps the cutter in place. Cutters can be sharpened on the face and the guide is simply pushed further in the hole after grinding.

Write for catalog "Small Tools"
showing our complete line.



Spot Facing
with a P. & W. Interchangeable Cutter Counterbore

Place a trial order with our nearest store.

Pratt & Whitney Company of Canada, Limited

DUNDAS
Ontario

MONTREAL
723 Drummond Bldg.

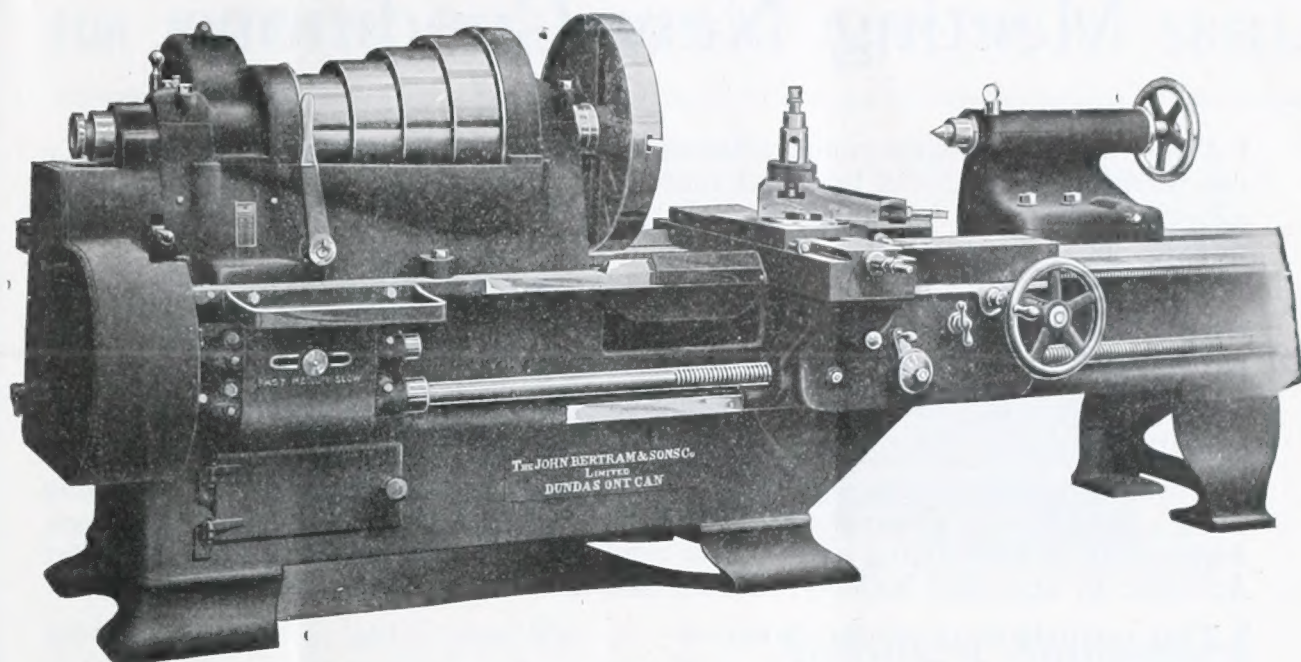
WINNIPEG
Bank of Hamilton Bldg.

VANCOUVER
B.C. Equipment Co.

The advertiser would like to know where you saw his advertisement—tell him.



BERTRAM MACHINE TOOLS



Double Back Geared Gap Lathe, 26 in. x 42 in. Swing

Protection for your
employees against
accidents.

Protection for your
plant against
damages.

*A
"Safety
First"
Machine*

Bertram Machine
tools are invaluable
because of their
safety and long ser-
vice. They are the
cheapest in the long
run.

The John Bertram & Sons Co., Ltd.

Dundas, Ontario, Canada

MONTREAL
723 Drummond Bldg.

VANCOUVER
609 Bank of Ottawa Bldg.

WINNIPEG
1205 McArthur Bldg.

The Publisher's Page

By B.G.N.

Meeting New Conditions.

¶ When an enterprising young salesman entered a business house one day with a patented machine he was told that there were no existing conditions to warrant its adoption. The new way might be a little quicker, it might be a little easier, and perhaps as accurate, BUT—

¶ This business house saw no immediate material gain, and didn't estimate the possibilities of the new Calculator when once the trial stages of development were passed and improvements added to meet requirements.

¶ They were working on the principle, somewhat belated, that to conserve expenditure is to save money.

¶ It was this same notion about spending versus saving that horrified Li Hung Chang, the Chinese Emperor, when he visited the United States some years ago. And it was an advertising expert who reminded the gentleman from Tokio that America, by spending lavishly, had become the richest country in the world.

¶ That reminds us of another story:—

¶ Three years ago when, in our opinion, Canada's rapidly developing market demanded a better and more frequent service than a monthly journal afforded, a section of our clients said the movement was all right, **but too advanced.**

¶ To-day, if we may be permitted to say so, there is scarcely one of our readers or advertisers who would be satisfied to wait a month for their paper. The Machinery and Metal-working field has undergone a transformation and is still shifting with the rapidity of Mercury. Conditions unforeseen brought about the change in a night, so to speak.

¶ We are able, in the midst of a world crisis, to place before our readers and advertisers a concentrated adequate weekly service, born of timely experience, that would have been impossible had the paper remained a monthly.

¶ **THE NEW CONDITIONS** we speak of are affecting your plant. The editorial columns of each issue of CANADIAN MACHINERY contain some article or articles relating to current problems and methods of meeting them. It will both interest and assist you to read these articles. To read the advertising pages will aid you in buying, and the use of them yourself will profit you in selling.

¶ **A card will bring you full information.**

CANADIAN MACHINERY

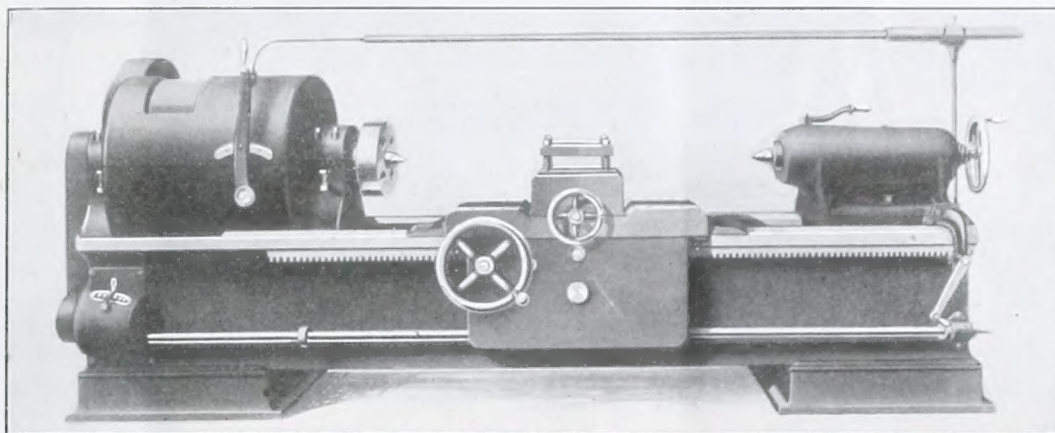
143-153 University Ave.

TORONTO

SIMPLEX

Single Purpose Heavy Duty Geared Head Single Pulley Drive Shell Lathe

This machine has the weight and proportions of a 42" lathe with special low swing
FOR MACHINING OPERATIONS on 8", 9", 10", 12" SHELLS



Swing reduced to $26\frac{1}{2}$ " over Vs.
Swings 15" over Bridge.
Bed length 12' or over.
Takes 5' between centres on 12' bed.
Crated weight plain lathe 12,000 lbs.
" " with all attach. 15,000 lbs.
APPROX. APPROX.

Standard Equipment

One (1) driving face plate.
Two (2) No. 6 morse taper centres.
Plain rest with 4-post tool holder.
2-speed double friction countershaft.

ATTACHMENTS:

Heavy Power Feed Bed Turret with
Independent Stops to Each Face
of Turret.
Heavy Turret on Carriage.

Four Tool Turret Tool Post.
Waving Attachment.
Profiling Attachment.
Standard Taper Attachment.

See this space Oct. 21st, 1915, for a shop talk on Shells.

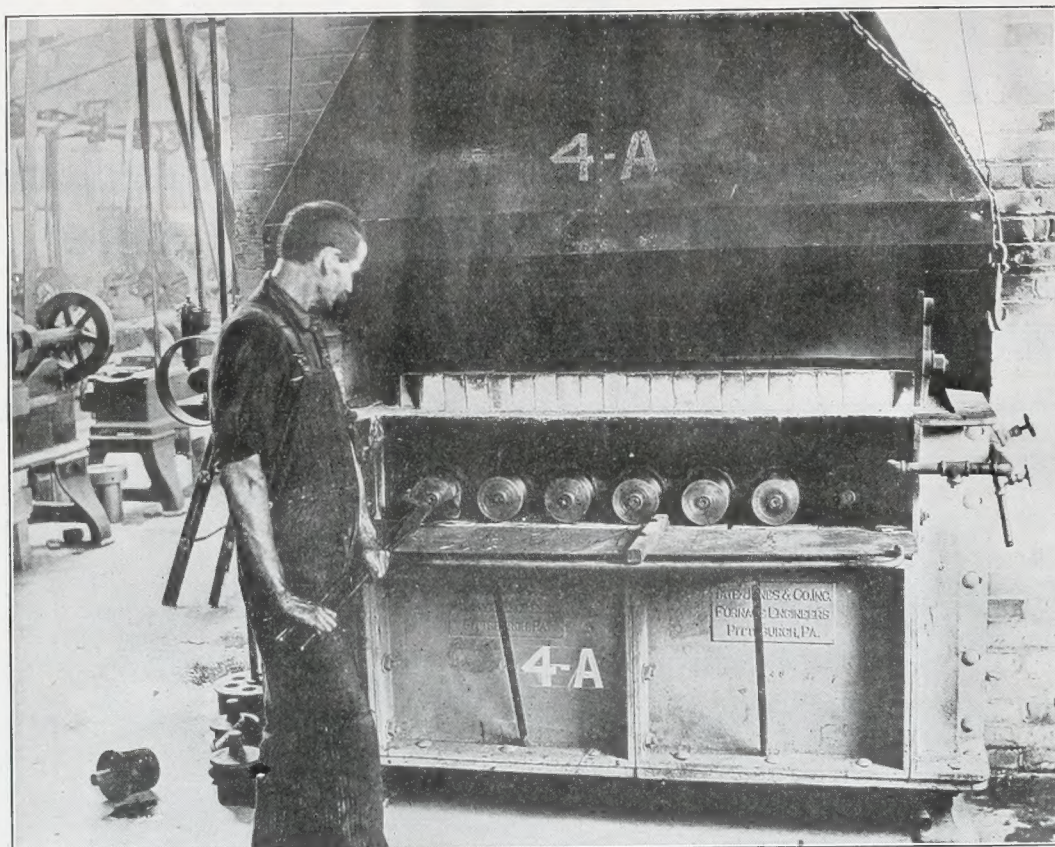
Exclusive Canadian Distributing Agents:

KELLOGG & COMPANY

1204 TRADERS BANK BUILDING,

TORONTO, CANADA

If what you want is not advertised in this issue consult the Buyers' Directory at the back.



Tate-Jones Furnace Heating 4.5 Blanks in Plant of Ker & Goodwin Co., Brantford.

For Rapid Heating For Nosing HIGH EXPLOSIVE SHELLS

3 in. - 4.5 in. or Larger size use a
TATE-JONES FURNACE

In one plant one Tate-Jones furnace turned out 116 heated 4.5 blanks per hour.

Are you getting maximum output for fuel used and floor space occupied?

Write for bulletins on "Shells and Shell Furnaces."

TATE-JONES & CO., Inc., Pittsburgh, Pa.
FURNACE ENGINEERS

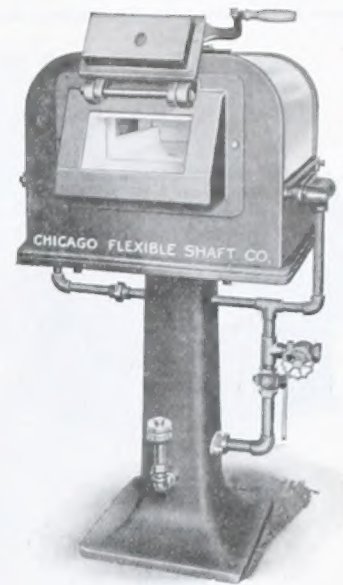
Ontario Agents: Rudel-Belnap Machinery Co., Limited, Toronto

The advertiser would like to know where you saw his advertisement—tell him.

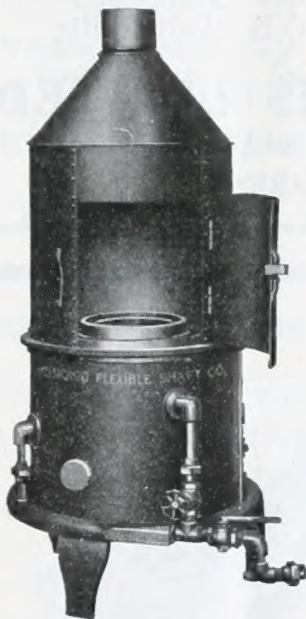
Stewart Gas and Oil Furnaces FOR THE TOOL ROOM, ETC.

To keep a plant up to its highest efficiency provision must be made for the proper hardening of its tools (high speed or carbon steel).

The Stewart No. 1 Oven has proven by most severe tests that it is equal to every occasion. The walls are 4" thick and made of a special mixture of fire clay and silica to withstand the high heats. By a Simple Control, heats may be varied from those for carbon steel to high-speed steel. The opening is 5" high by 9" wide by 13½" deep. The average gas consumption 100 cubic feet per hour. **Price with blower \$100.00. Price without blower \$75.00. Twenty-seven other sizes of ovens in stock.**



STEWART NO. 1 OVEN



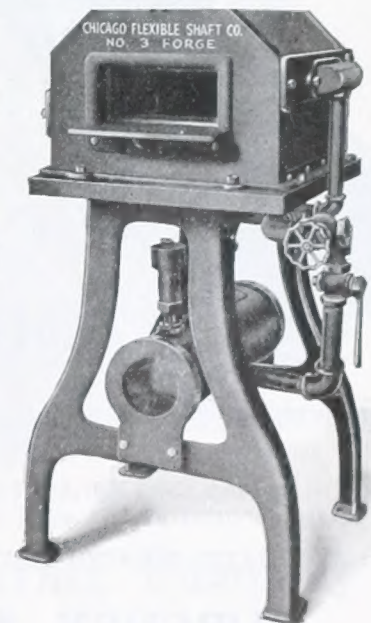
Stewart No. 10 Cyanide Furnace

The Stewart No. 10 Cyanide Furnace may be used for any sort of a bath requiring a heat under 1800° Fahr. It is fitted with a hood to carry the poisonous or offensive fumes to a flue. The pot is of pressed steel and is 8" in diameter and 10" deep, ¼" thick, allowing a quick heat. By having a number of extra pots (\$4.00 each), as many different baths as desired may be used. Lead or cyanide hardening—salts bath—oil tempering, etc.

Price with blower	\$115.00
Price without blower	75.00

We have 24 other stock sizes in this type.

This Stewart No. 3 Forge is most convenient in the tool room for tool dressing, forming, shaping or bending. The front opening is 3½" x 8" and gives a heat 10" long. Rear opening 3¼" diameter (same size as front if specified.)



No. 3 FORGE

High heats (direct) may be obtained much more quickly than in an oven and may be held indefinitely. Occupies little floor space (23" x 26") and consumes about 90 cubic feet of gas per hour. This, like all other furnaces, must operate on a positive air pressure of 1½ lbs. to the square inch, which is best supplied by a positive pressure blower.

Price with blower	\$65.00
Price without blower	40.00

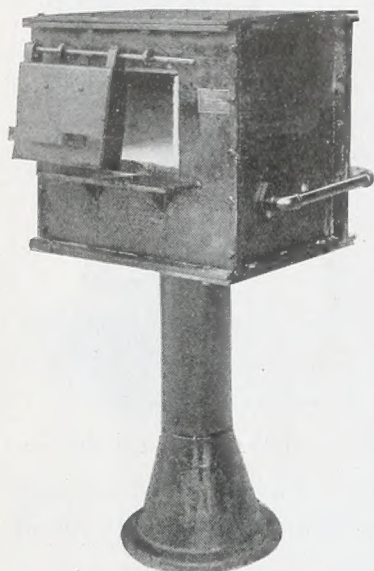
Send for our catalogue No. 56. Tell us your requirements and we will make recommendations.

Chicago Flexible Shaft Co.

210 to 230 Ontario St., CHICAGO

If what you want is not advertised in this issue consult the Buyers' Directory at the back.

MADE IN
CANADA



G-53 for Gas.

Pyrometers on either Furnace,
\$50.00 extra.

HOSKINS
TRADE MARK REGISTERED

HIGH SPEED STEEL TOOL FURNACE

Extra heavy construction of shell and 4½" fire-brick lining insure long life.

All fire-brick linings in HOSKINS gas furnaces can be replaced in your factory.

Properly designed burners insure economical fuel consumption and give a non-oxidizing flame.

Immediate delivery can be made on a limited number.

Chamber dimensions, 6" high, 9" wide, 12" deep.

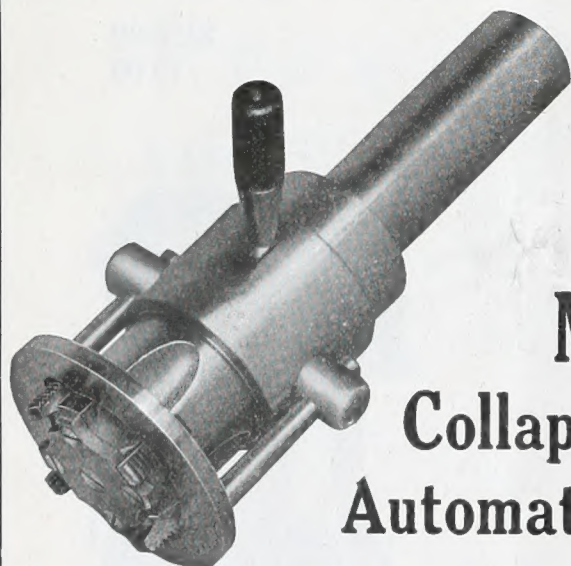
G-51 for oil\$65.00 F.O.B. Walkerville

G-53 for gas\$60.00 F.O.B. Walkerville

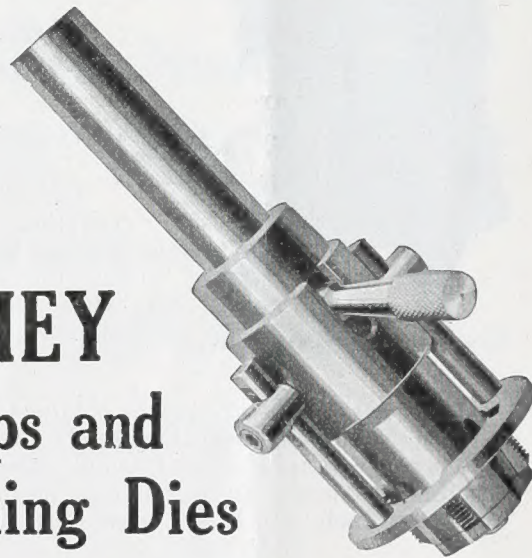
CANADIAN HOSKINS LIMITED

Electric, Gas and Oil Furnaces and Pyrometers.

WALKERVILLE, ONTARIO



MURCHEY Collapsing Taps and Automatic Opening Dies



MURCHEY TAPS are tapping Shells and have been ever since this country started to manufacture them. They can be adapted to all kinds of machines.

The striking thing about **Murchey Tools** is their wonderful simplicity and few number of parts compared with others. There are a number of economical features that you should know of.

Our **AUTOMATIC OPENING DIES** are threading the plugs of Shells with equal satisfaction.

MURCHEY MACHINE & TOOL COMPANY

64 Porter Street, Detroit, Michigan

The advertiser would like to know where you saw his advertisement—tell him.



One of the types of Crawford Sectional Ovens used by Manufacturers for Baking the Varnish or Protection Finish on Shrapnel and High Explosive Shells.

These ovens are equipped with the only gas burner that gives a combined radiated heat and circulation of pre-heated air in the oven.

The gas and air are mixed and combustion in the large cylinder supported by air from a positive pressure blower which gives the highest efficiency and economy known for burning either city, natural, gasoline or producer gas, and there is no exposed flame in the oven.

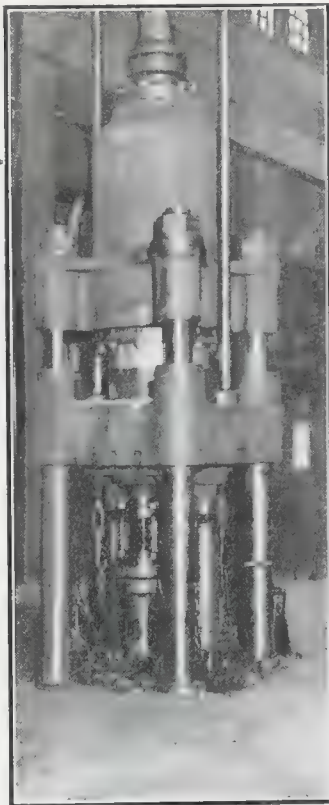
The truck shown holds (120) twenty-eight-pound shells and is planned to stand the shells on end, resting on angles. Other designs have been built for shells ranging in weight from fifteen to eight hundred pounds, the last mentioned shell being forty-eight inches high by twelve inches in diameter.



The Oven Equipment & Manufacturing Company
NEW HAVEN, CONN., U.S.A.

Canadian Representatives: THE A. R. WILLIAMS MACHINERY CO., LIMITED, TORONTO, CANADA

If what you want is not advertised in this issue consult the Buyers' Directory at the back.



PIERCING PRESS

Hydraulic Presses

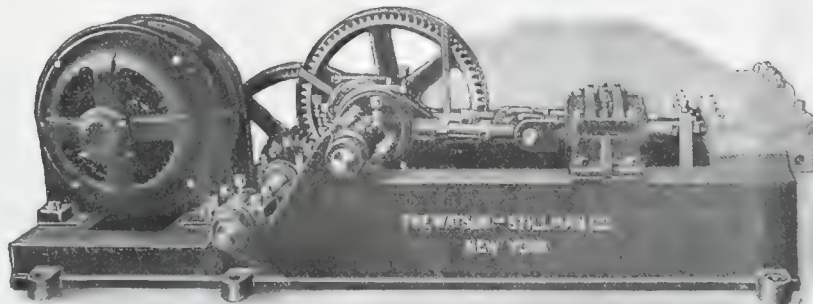
for

Shell Manufacturing

We are making
HYDRAULIC PRESSES

for Piercing and Drawing
Shells and Projectiles
and are in a position to give
Prompt Delivery

**The William Cramp & Sons Ship
and Engine Building Company**
PHILADELPHIA, PA.



Motor Driven Geared Triplex Pump

ARE YOU GETTING 100% EFFICIENCY FROM YOUR HYDRAULIC MACHINES?

If you need more power or are thinking of new installations it **will pay you** to investigate Watson-Stillman Pressure Pumps. Our line is extensive and covers a wide range of types and sizes—over 700, and we are constantly adding to this line.

The pump illustrated here is one of our latest developments, and while designed principally for tunneling service its compact, rigid construction, large passages and valves and general refinement make it an ideal pump for high pressure work. It is driven by a 10 h.p. motor, and delivers 100 cu. in. at 100 r.p.m. at 2500 lbs. pressure.

We make a specialty of Hydraulic Machinery and build a very large variety over 4500 types and sizes. Presses, benders, jacks, valves, shears, etc.

Write for our Pump catalog No. 81, and let us tell you more about Watson-Stillman pumps.

THE WATSON-STILLMAN CO.

36 DEY STREET, NEW YORK

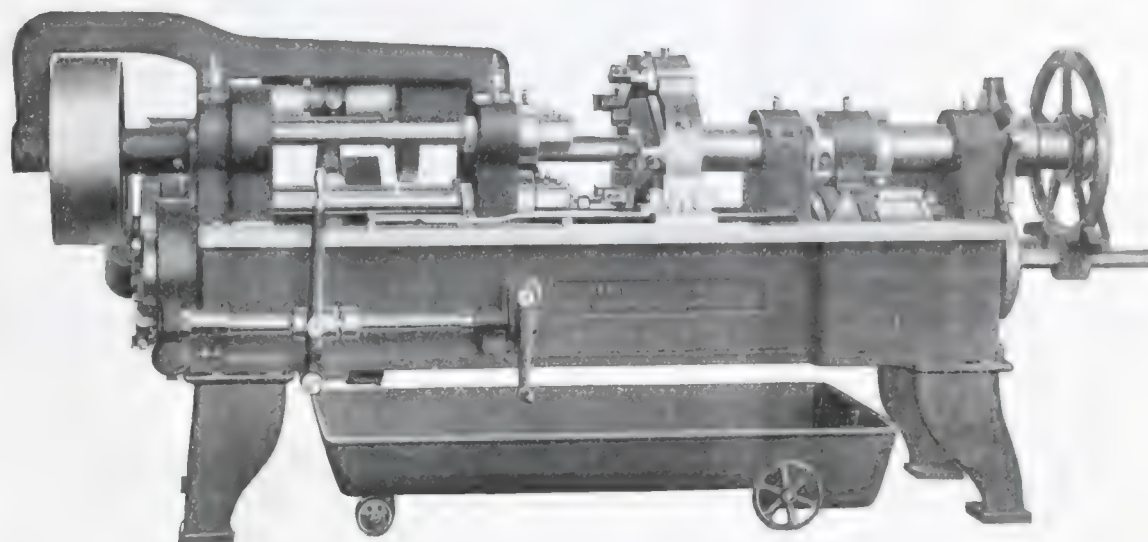
CHICAGO, McCormick Bldg.

245



The advertiser would like to know where you saw his advertisement—tell him.

THE MACHINE FOR SHELL PARTS



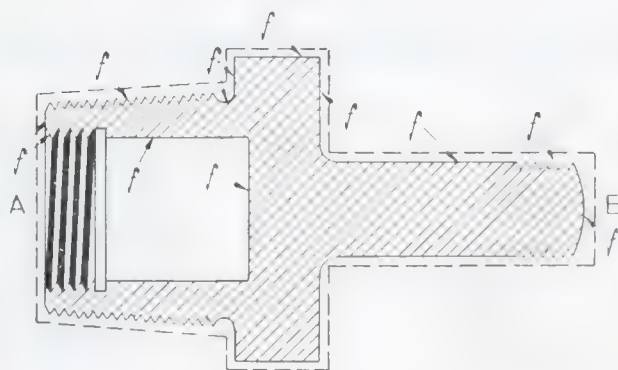
38 Time Fuse Bodies Per Hour!

Labor Cost:

79Cents Per 100

This Time Fuse Body is machined complete at **two settings** in Size 23 Automatic Four Spindle, Single Head Chucking Machine of type illustrated above.

Outline of rough forging is indicated by dotted line on drawing.



Material:

Brass Forging

OPERATIONS

End A. Bored from solid, Reamed, Recessed, Turned Taper Face, Flapped and Threaded, at the rate of 55 pieces per hour.

End B. Turned and Flapped on head and stem, Chamfered and Threaded, at the rate of 120 pieces per hour.

The coarse, straight internal thread and the fine tapered external thread on end A were cut simultaneously by means of a combination tap and die holder. Likewise the internal and external undercuts back of threads were formed at one time by a special combination cross-cut tool. Operations on end B are performed while piece is held at end A by threaded draw-back arbor. The end of arbor pilots in large hole in end A, accurately centering the piece and insuring perfect concentricity of the two ends.

**SINGLE-HEAD
MACHINE
IN FOUR SIZES**

It is barely possible a "New Britain" could not be adapted to your work—but the odds are in its favor. Isn't positive advice on this question worth the postage required to get blueprints of your chuck work to us?

**DOUBLE HEAD
MACHINE
IN THREE SIZES**

The New Britain Machine Co.

—Automatic Screw and Chucking Machines—

NEW BRITAIN, CONN., U. S. A.

If what you want is not advertised in this issue consult the Buyers' Directory at the back.

We Have for Prompt Shipment

18" Engine Lathes, Double-Back Gears, Quick-Change Feed.

24" Turret Lathes, Power Feed.

26" Turret Lathes, Power Feed, Heavy Duty.

26" Engine Lathes, Double-Back Gears, Quick-Change Feed.

Double Spindle Horizontal Drills, Cutting-Off Machines.

Write For Prices.

GARLOCK—MACHINERY

197 Wellesley Street, Toronto

Telephone, North 6849

Two Cuts at One Time

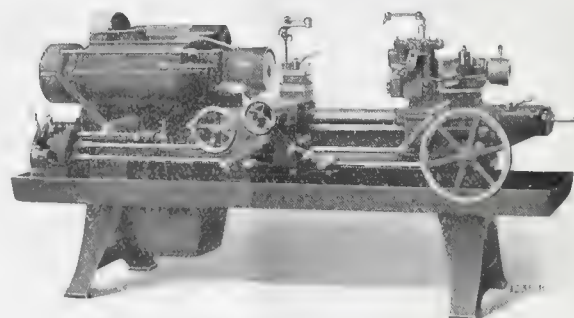
The ability to face, undercut or neck with the square turret while boring or turning with the hollow-hexagon turret contributes largely to the time-saving and economical output of the

Universal Hollow-Hexagon Turret Lathes

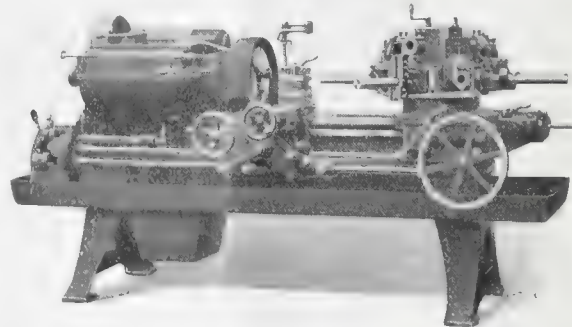
Separate feed shafts, each with ten individual feeds, operate the carriage and turret saddle independently, and provide the exact feed required for each.

And to this great advantage are added the other essentials for rapid and accurate production—excess power, extreme rigidity, great adaptability, and a power rapid traverse that saves time and conserves the energy of the operator.

Without obligation, ask us to show the saving on one of your typical jobs. Send blueprints with rough and finished samples.



No. 2 A—With "Bar Equipment"



No. 2 A With "Chucking Equipment"

THE WARNER & SWASEY CO., Cleveland, Ohio, U. S. A.

Canadian Agents: A. R. Williams Machinery Company, St. John, Toronto, Winnipeg, Vancouver; Williams & Wilson, Montreal.

The advertiser would like to know where you saw his advertisement—tell him.



“Modern” Self-Opening and Adjustable Die Heads

Mean Greater Output of Precision Work and Elimination of Spoiled Pieces

Supported to insure the cutting of a perfectly straight thread, of full size and accurate lead, and the heads will not clog with chips, necessitating frequent cleaning.

All “Modern” Heads now have our cleaning improvement, which permits cleaning without disassembling the head. The chaser blocks in which the chasers are rigidly held, are firmly supported by a tool steel cam ring.

The “Modern” Die Head is made in a single style that will cut all threads, coarse or fine, of standard or special pitch and pipe threads, of any diameter or length within the capacity of the Die.

No other make of Self-Opening Dies has been able to attain these advantages, hence, if you desire a larger output of precision work, and a wider range, with a minimum investment, you will be compelled to purchase a “Modern” Die Head. So if you are having trouble with your present threading tools, you can eliminate this trouble by installing “Modern” Heads.

Drop us a line for descriptive circular.

Modern Tool Company

Main Office and Works: State and Peach Streets, Erie, Penn'a

Canadian Agents: Rudel-Belnap Machinery Co., Toronto and Montreal

If what you want is not advertised in this issue consult the Buyers' Directory at the back.



WE MANUFACTURE RIVETS of every description, $\frac{1}{2}$ inch. dia. and smaller.

PARMENTER & BULLOCH CO., LTD.
GANANOQUE, ONT.

NORTHERN CRANE
WORKS, Limited
WALKERVILLE, ONT.

BUY IN CANADA!



NORTHERN CRANES

ELECTRIC AND HAND POWER
ALL SIZES, CAPACITIES AND TYPES
ALSO ELECTRIC AND AIR HOISTS
Foundry Equipment—Cupolas, Ladles, Etc.



Shell Tapping Turning JUSTRITE

Canadian Distributors:
Rudel-Belnap Machinery Co.
Montreal Toronto

CRESCENT OIL CO.



and Forming Reaming Cutting Lubricant

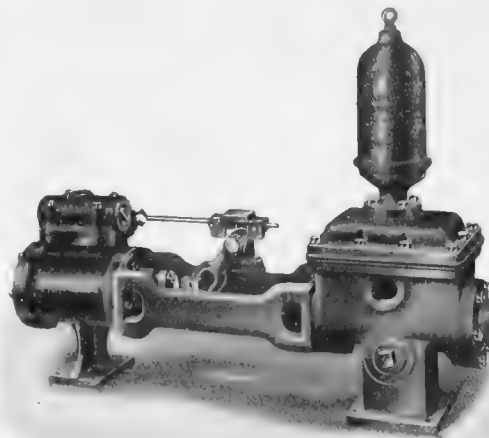
Let us tell you why Canada's
largest shell shops use it.
Write

30 Church St., N. Y. City

BURNHAM STEAM PUMP

Of the thousands of steam pumps installed every year, a large percentage of them bear the name of "Burnham," the *Steam Pump* endorsed by leading Architects, Consulting Engineers and Heating Contractors as the best, simplest and most economical pump on the market.

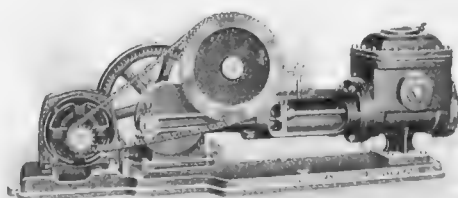
If you want a pump for handling hot water, use the "Burnham."



Thousands of Burnham pumps are in operation in connection with *Vacuum Heating Systems*; they are specially adapted for this service. Standard Burnham Boiler Feed Pumps and Burnham Vacuum Pumps are kept in stock and can be shipped promptly.

Ask for Catalog
"P"

Burnham Boiler Feed Pump



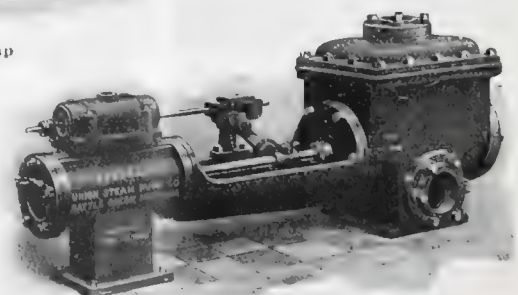
Union Electrically Driven Vacuum Pump

Darling Brothers

Limited

15 Ottawa Street
MONTREAL

Toronto Winnipeg



Burnham Vacuum Pump

Anaconda Belting



Are you willing, is your Power Department willing to stop thinking of belting in terms of material and consider it in the light of power delivered—strength, tractive qualities, economy of upkeep, length of life, and after these are considered, cost of installation?

**Main Belting Co. of Canada
Limited**
10½ St. Peter St., Montreal

WATCH FOR OUR MESSAGE IN NEXT WEEK'S ISSUE.



If you're a pulley user you've seen many of these pulleys--**AMERICANS**—in the shops you visit.

With over 2¼ million marketed and distributed in plants throughout the States and Canada, their nation-wide popularity is clear—and it has twenty successful years of solid pulley service behind it.

People buy **AMERICAN PULLEYS** for their accuracy, their light weight, their strength, their permanency, their interchangeability on shafts of various diameters; they buy them for their power-saving qualities—since they cut the air instead of fanning it (ask us for an interesting data sheet on this important subject), and they buy them because they're always easy to obtain anywhere in any desired size.

Permanent stocks of 50,000 American Steel-Split Pulleys in five warehouses supplement the additional thousands stocked by more than 200 dealers, and sizes run anywhere from 3 to 120 inches in diameter.

Send for catalog, price lists, or special information to-day.

The American Pulley Co.

4206-60 Wissahickon Ave.,
Philadelphia, Pa., U.S.A.

BOSTON NEW YORK CHICAGO SEATTLE

Williams & Wilson, Ltd., Montreal
The A. R. Williams Machinery Co., Ltd.,
Winnipeg, Toronto, Vancouver, St. John, N.B.

AMERICAN

STEEL SPLIT PULLEY



ECONOMIC WATER OIL

SHELL MANUFACTURERS use ECONOMIC WATER OIL for METAL CUTTING of every description; it will not gum nor rust, and it SAVES TIME AND LABOR.

WE CAN SAVE YOU 50% in the COST of your CUTTING MIXTURE BECAUSE

ONE GALLON of ECONOMIC WATER OIL will mix readily with 30 to 50 gallons of WATER, making a thick, creamy emulsion, and giving you a cutting mixture which will not only be satisfactory, but will produce very **ECONOMIC RESULTS**.

One TRIAL ORDER will prove our STATEMENT.

Made in Canada

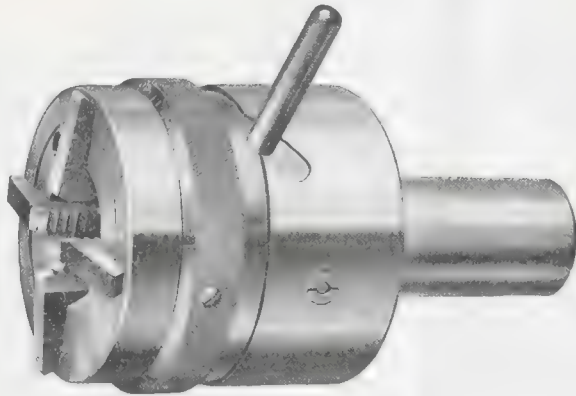
Canadian Economic Lubricant Co.
LIMITED

1040-1042 Durocher St.

MONTREAL

If what you want is not advertised in this issue consult the Buyers' Directory at the back.

Good Threads Cost Less Than Poor Ones



Wells Self-Opening Die—Model 1 B.

The advent of the W.S.O.D. in his shop, has opened the eyes of many a manufacturer producing screw threads to the fact that he can

**Increase Production
Decrease Costs and
Cut Perfect Threads**

all at one and the same time.

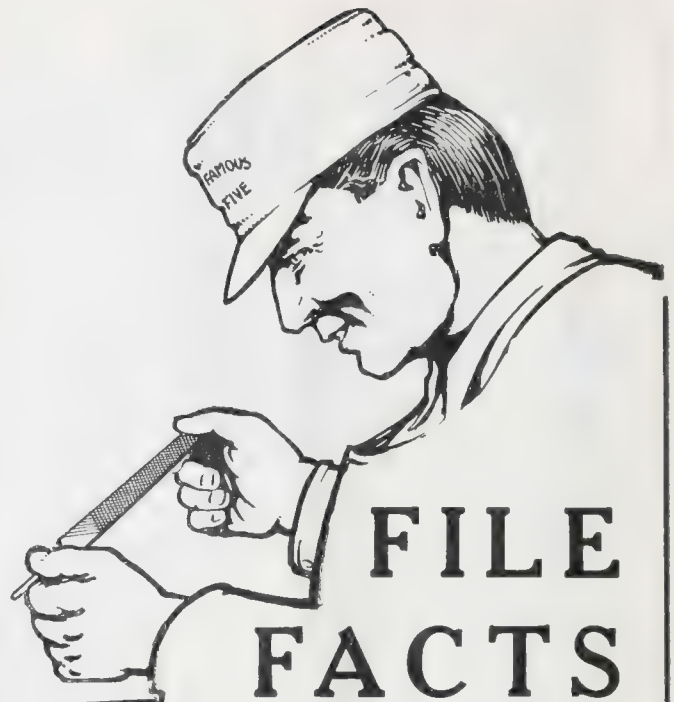
Do you want us to prove it? We are ready.

We want to send you the booklet describing the different models. Are you willing to try the W.S.O.D. in your shop under your own conditions?

Wells Brothers Company
of Canada, Limited
GALT - ONTARIO

Sales Agents:

The Canadian Fairbanks-Morse Co., Limited, Montreal,
Toronto, Vancouver, Winnipeg, St. John, Calgary.



It isn't enough to merely *use* the
"Famous Five":

**KEARNEY & FOOT
GREAT WESTERN
AMERICAN
ARCADE
GLOBE**

(Made in Canada)

To get the VERY BEST results—you should use them RIGHT.

Teach your workmen that, at a certain point in its life on any work, a file's BEST efficiency is passed. Beyond that point—continued use means *lost time, wasted effort, decreased production and increased cost.*

When they understand this fact, they'll discard worn files promptly — as they should. They'll save enough time and labor to pay you a handsome net profit over and above the extra file-cost.

Only by using the "Famous Five" RIGHT do you get the FULL benefit of all we give. The benefit of our 50 years' experience—our five great plants—our special automatic machinery—our complete control of every factory process—our 60,000,000 yearly output—and our record of 90 per cent. of Canada's file-trade.

Each and every one of these advantages should spell MORE NET PROFIT for YOU! Are YOU getting YOUR share? "File Philosophy" shows HOW. Write for FREE copy—NOW.

Nicholson File Company
Port Hope Dealers Everywhere Ontario

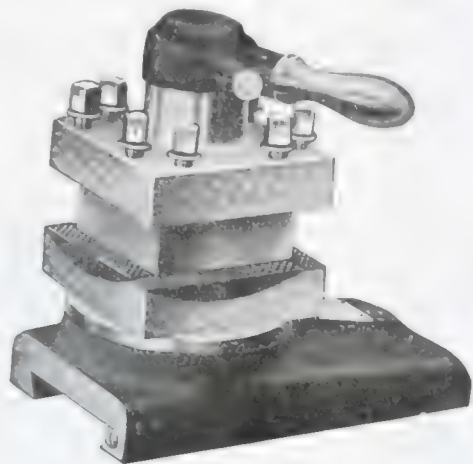
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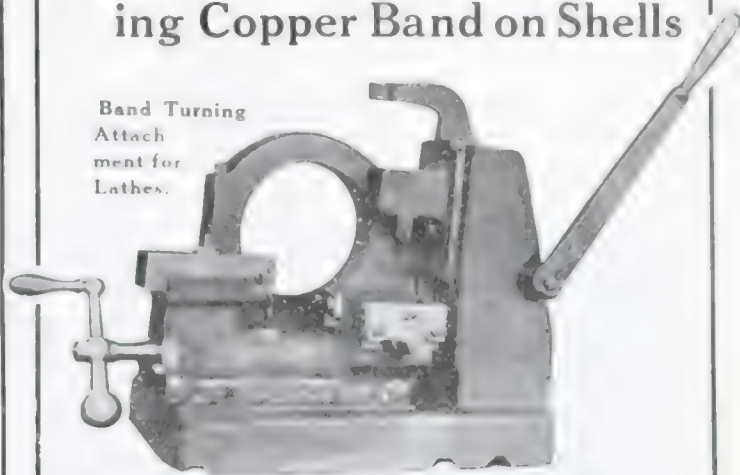
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Band Turning
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This attachment will turn copper bands on shells with the same accuracy as turning the copper band on a standard lathe. It is the only required and latest style, and in one operation.

With this device we will guarantee an output of

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Norton's Crystolon grinding wheels are made of a special material which is known as Crystolon. This material is a synthetic material which is made of a special material which is known as Crystolon. This material is a synthetic material which is made of a special material which is known as Crystolon.

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Producing Fuse.Sockets and Plugs for Shrapnel Shells

Staff Article

The production of these necessary components of high accuracy, and yet at a price low enough to be consistent with the temporary nature of the service required, is well instanced in the manufacture of sockets and plugs.

THE observations and impressions derived from a visit to a small factory manufacturing the component parts of the finished shrapnel shell give to the thoughtful mind a clearer conception of the energy and resourcefulness of the American manufacturing industry. When the time comes for him to develop to the utmost the equipment at his command.

The speed with which this productive power has been brought to the highest point of efficiency shows the determined interest and sterling qualities of both the manufacturer and the various artisans required to produce the necessary results.

One of the features of this great movement which is worthy of commendation is the co-operation of effort among many manufacturers to reduce to the minimum the delay often necessary when equipment is required for the completion of one or more parts of a much needed article. Often a manufacturer may be able to accomplish the required result with the exception of one operation. To do this operation it may be necessary to install expensive machinery; but if this operation can be performed in another establishment within a reasonable distance, the co-operation of these firms along the desired lines may mean much to the manufacturer.

component parts are required which necessitate their production in separate plants to those required for the main body of the shell.

the production of gas and electrical fixtures, as well as filling orders for a large variety of brass and aluminum articles.



FIG. 1. CRUCIBLE SECTION OF BRASS-FOUNDRY WHERE SLUGS FOR FUSE SOCKETS ARE PRODUCED.

of the shell body. In producing the fuse sockets and brass plugs which form the nose of the finished shell, one of the necessary requirements is the brass foundry.

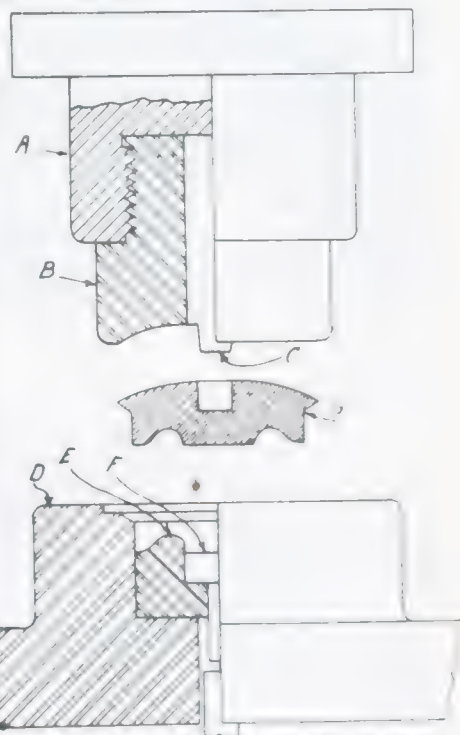


FIG. 2. METHOD FOR CASTING SLUGS FOR FUSE SOCKETS.



FIG. 3. FUSE SOCKET PRODUCTION IN THE FOUNDRY.

outcome, as well as mutual benefit to themselves.

In the manufacture of shells, both shrapnel and high explosive, many com-

The subject matter of this article was obtained from observation and impressions derived from a visit to a plant, which for years has been employed in

Casting the Slugs.

Fig. 1 shows a view of the foundry where the slugs are cast before the forging operation. In this picture is shown

the crucible section where the various metals are melted before pouring into the moulds. At the extreme right and also at the left are two crucibles which

have a capacity of 500 lbs. apiece; another of these is shown in Fig. 2, which is being repaired. Beside these three, there are ten others beneath the floor,

each having a capacity of 150 lbs. These furnaces (of natural gas) are in operation at present 24 hours a day, metal being poured off at intervals of 15 or 20 minutes, day and night. The composition of this metal for the fuse sockets

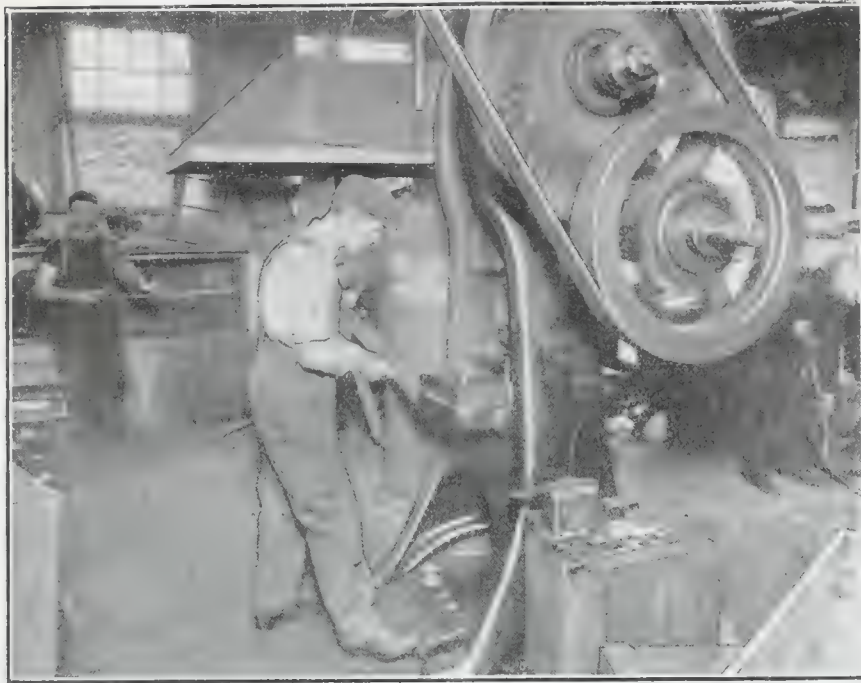


FIG. 3. LOWER PRESS FORGING SLUGS INTO FUSE SOCKETS AND PLUGS

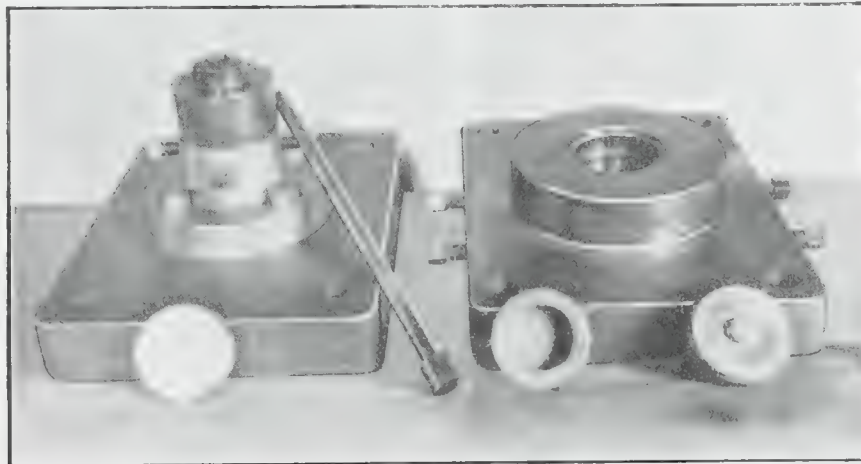


FIG. 4A. DIE FOR FORGING BRASS SOCKETS.

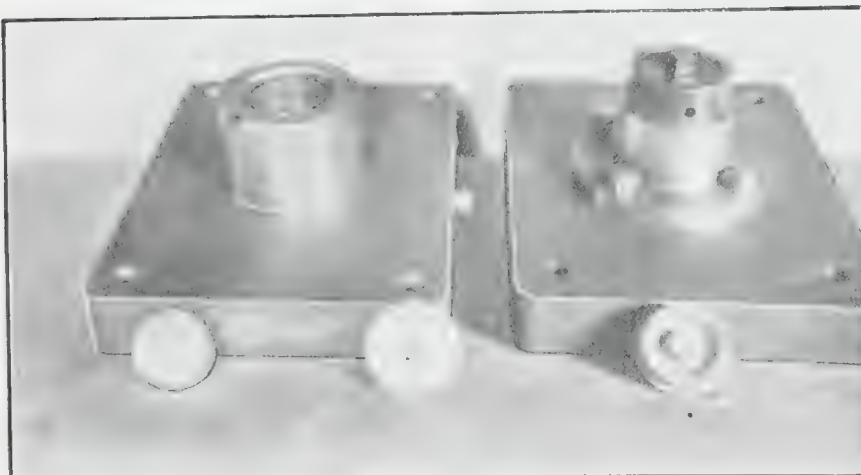
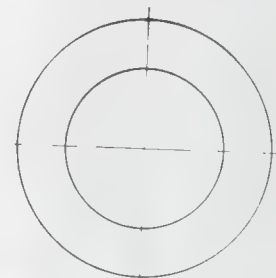
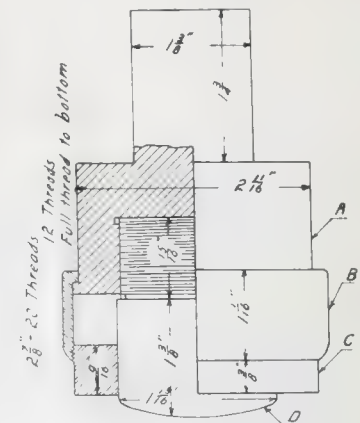


FIG. 5A. DIE FOR FORGING SOCKET PLUGS



SECTION OF SOCKET AND DIE.

is 40 per cent. copper, 58 per cent. zinc, and 2 per cent. lead.

Fig. 2 shows a view of the floor and benches where the metal is poured into the various moulds previously prepared.

Forging Fuse Sockets and Plugs.

After the slugs are sufficiently cold to be removed, they are shaken out and gathered up and taken to another factory some distance away, who have a

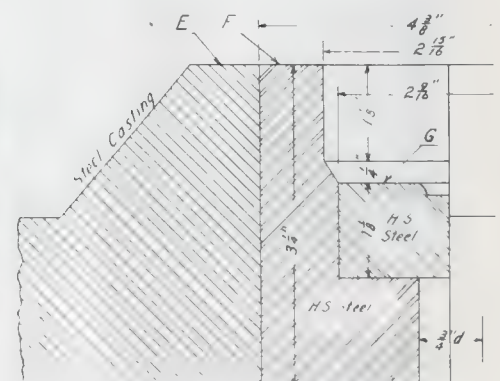


FIG. 4. DIE FOR FORGING BRASS SOCKETS.

press suitable for forging these slugs into the desired shape.

This operation is shown in Fig. 6. In the background is the furnace where the slugs are heated to a cherry red and

Machining Sockets.

The first machining operation is performed on a Warner & Swasey turret machine. The cycle of operations is chucking, roughing from the back, under-

ishing from the front, and threading with the die. The sockets are then drilled and tapped for a small screw used for locking time fuse in position; they are then retapped to the finished size.

Machining the Plugs.

The work on the plug is done at one setting, the cycle of operations being chucking, roughing, undercutting and threading. This operation is shown in Fig. 8. These plugs are used to protect the fuse socket during the period of transportation, after which they are replaced by the timing fuse.



HOW METAL COOLS FROM LIQUID TO SOLID

IN THE course of a lecture delivered before the Sheffield branch of the British Foundrymen's Association on April 30, Dr. W. Rosenhain, F.R.S. (Head of the Metallurgical Department of the National Physical Laboratory), advanced an interesting theory, the consideration of which might enable one to understand some of the things which happen during the cooling of metals.

Special attention was given to the consideration of the existence of non crystalline or amorphous layers in metal bodies which have been cooled from a liquid condition. The "change of state" which took place during solidification involved something more than the formation of mere crystals commonly understood. Crystals invariably form at right angles to surfaces which happen to be at uniform temperatures, the growth of these crystals beginning at different points of centres termed nuclei where the temperature of the metal first reaches the freezing point. Each of these nuclei or centres then extended in all directions, meeting the arms of other nuclei and causing the crystal growth to permeate the whole body as quickly as the various parts reached the state of solidification, on freezing point.

By a crystalline body was meant one in which the particles, of which the body was composed were arranged in some regular manner. The absence of such a crystalline formation was termed an amorphous state, and science had enabled a very considerable insight to be obtained regarding the manner in which these particles were formed, as well as their absence. The growth of a crystalline structure did not result from the building up of successive layers, but by shooting out branches until these met other branches and the intervening spaces were filled up. What was it that made the atoms of the metal arrange themselves in this way? Clearly there the atoms turn and arrange themselves.

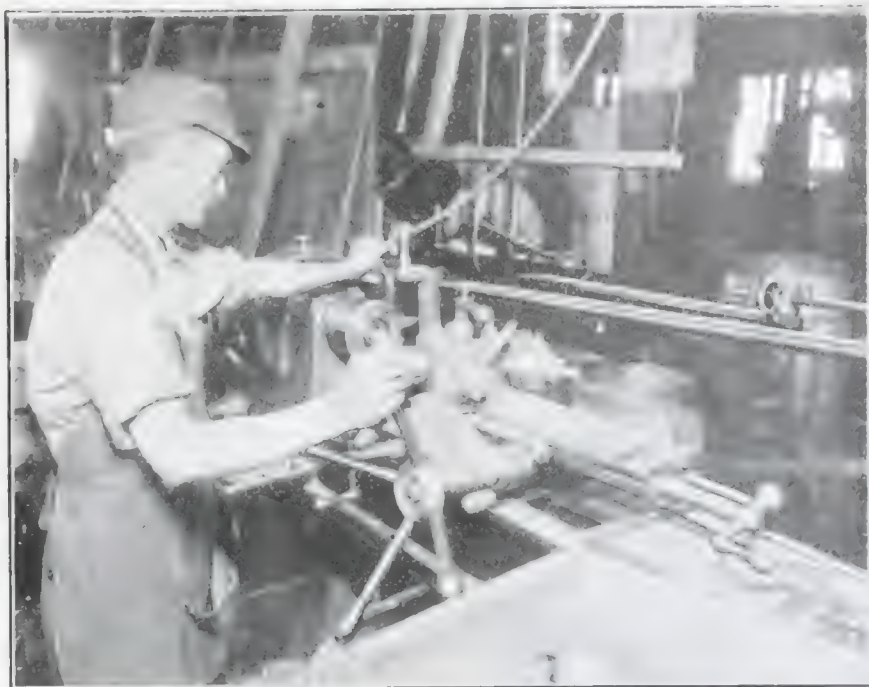


FIG. 6. FIRST MACHINING OPERATION ON FUSE SOCKETS

passed to the man at the press by means of the trough shown. This operator places the hot slug into the die and the punch upon descending forms the piece into the desired shape. The construction of these dies is shown in Figs. 4 and 5, Fig. 4 being the die for the sockets and Fig. 5 the die for the plugs. A view of the finished forging is also shown with each die; also shown in Fig. 4a and 5a.

ting, tapping, finish face and ream. At periods during these operations a blast of air is forced into the recess to remove surplus cuttings; this is shown in Fig. 6.

The second operation on the fuse sockets (also done on a Warner & Swasey turret machine) is the finishing of the side which screws into the nose of the shell. This operation is shown in Fig. 7. The cycle of operations is chucking, roughing from the back, fin-

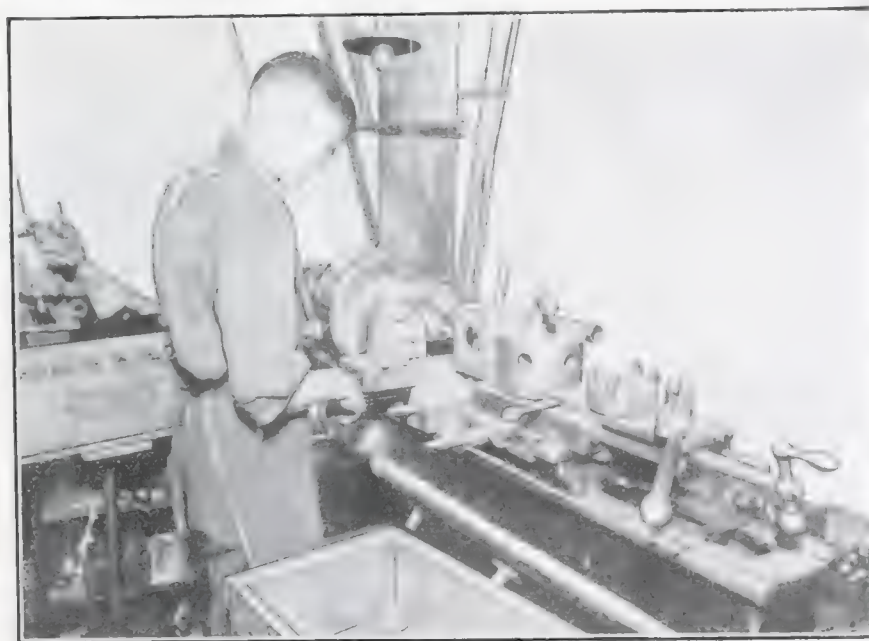


FIG. 7. FINISHING FUSE SOCKETS ON A "WARNER & SWASEY" TURRET LATHE

and determined whether a given atom should adhere to one crystal or to another. It would appear that the attractive force acting on the atom from one crystal was greater than those acting upon it from another.

The Amorphous Theory

But ultimately a point must be reached between two growing crystals where the opposing forces of the crystal growths were nearly balanced and the atom was not impelled very strongly one way or the other, and therefore did not range itself definitely on either side. The effect of the two such opposing forces was very clearly illustrated in the attraction of iron filings by the two similar poles of a magnet (as shown by

formation of the body as a whole was accomplished by deformation of the crystals themselves.

A temperature of 900 deg. Cent., however, approached somewhat to the softening point of the amorphous layers, while the crystals melted suddenly and changed from the solid to the completely liquid at a much higher temperature. At such a temperature as 900 Cent., nearly all movement took place by the sliding over one another of the boundaries. Thus the flow of these metals at high temperatures obeyed the law of the flow of various liquids. To carry the process a little further, the deformation might be continued until rupture took place; in the cold metal the crystals broke across but at a suitable high tempera-

the difference in the mechanical properties of metals, which depended upon the size of their crystal structure; and the curious difference in their elastic limit was very readily explained by it. It also served to give a reasonable explanation to that most puzzling of all facts, that a very small proportion of impurities produced such enormously disproportionately large mechanical, electrical and other effects; these added bodies would always tend to concentrate themselves in this amorphous cement, and might account for the large effect of vanadium on steel. This, he thought, was one of the most fruitful applications which the theory offered, but a good deal remained to be done in working out these applications; it showed why other things injured steel, because they spoiled the binding power of this amorphous cement. Dr. Rosenhain also discussed the separation of the various constituents of alloys, the formation of solid solutions, and the formation of cores. Cores were due to the rate of cooling; only by a slow cooling could completely homogeneous crystalline aggregate be obtained. The limitation of phosphorus in steel was considered, fissures in shrapnel shells being due in his opinion to regions of low carbon and high phosphorus, resulting in layers of different hardness. The remedy was to eliminate the phosphorus as far as possible, or to render its distribution uniform. One way was to decrease the speed of solidification of the steel, and if that was impracticable, the next best thing was to anneal the steel very drastically at a certain stage in the working.



FIG. 8. FINISHING BRASS PLUGS ON FLAT TURRET LATHE.

means of a slide) between which there was a distinct neutral ground where the two opposing sets of forces were so nearly balanced that the particles of iron arranged themselves in a completely indifferent manner. So in the case of a cooling mass of metal, there would be a neutral zone between any two crystals where the atoms would go on cooling down without arranging themselves in crystalline order. This amorphous or non-crystalline layer between the crystals of metal would have the hardness characteristic of all under-cooled materials. The behaviour of pure iron which would consist of crystals of iron, with amorphous layers between, was considered. The amorphous layers would be stronger and harder than the crystals themselves, and if strained or deformed there should be very little movement at the boundaries of the crystals, all the movement taking place within the crystals themselves. Slides were exhibited which showed that de-

ture the crystals could be pulled apart from one another quite easily, so that the fracture followed the crystal boundaries. Several slides were shown illustrating the varying course of the fractures at different temperatures, with various metals, including purest gold, to show that the action was not attributable to the presence of impurities, as was sometimes suggested by opponents of the theory which was also confirmed by experiments in vacuum.

Experiments in latent heat also, in the opinion of the lecturer, clearly indicated differences which would be very hard to explain on any other physical ground. He was quite prepared to admit that there was no definite proof of the existence of this "amorphous cement," but some people would never be convinced until one could hit them with a piece of amorphous metal. At the same time he thought there was enough evidence to indicate that there must be something in the theory. It explained

ZINC DISCOVERED IN NORTHERN QUEBEC

ZINC in large quantities is reported to have been discovered in the vicinity of Burbridge Lake, in the Upper Gatineau district, Quebec, north of Ottawa. Denis Callahan, a Haileybury prospector, recently found evidences of this mineral in that part of the Laurentian hills, and engineers will investigate.

John D. Macfarlane, a mining engineer of Shawville, who was in the capital on his way up to look over the locality, believes it possible that zinc will be found there in considerable quantities. He is familiar with the country, and reports already made indicate that the deposits may prove as valuable as those now controlled by the New Jersey Zinc Corporation in that state. Conditions in the Burbridge Lake district are reported to be similar to those existing where this corporation has its wealthy deposits. Zinc is selling at very high figures just now on account of its use in the manufacture of war munitions.

Autogenous Welding with the Oxy-Acetylene Blow Pipe

By C. Rover

Welding by means of the oxy-acetylene process is a method of joining metals which has been adopted in connection with almost any description of metal work. The possibilities possessed by it as a manufacturing process have not, however, been fully recognized, and it is in this direction that further future developments of the art are most likely to take place.

THE successful application of autogenous welding in very many instances has proven to the industrial world the great utility of this process. The possibilities of this process are continually being demonstrated in hundreds of workshops, where its successful application in daily work indicates the almost unlimited field of usefulness which the future holds for it.

Electrical, Chemical and Autogenous Welding

Before proceeding with the subject of this lecture, it might be desirable to mention the subject of electric welding. Electric welding consists of the application of electrical energy in such a manner that the temperature of the work will be raised to the desired point in two ways, either by causing the work or certain parts of it to form a resistance circuit and be heated by the effort of the current in overcoming the resistance, or by striking an arc between a suitable electrode and the part of the work to be welded.

In the first case, the two parts to be welded are pressed together, and the current supplied through electrodes on either side of the contact joint, the resistance of which causes local heating of great rapidity, which soon reaches welding point, when the two parts are inseparably united at the point of contact.

*Lecturer on Electric Welding, University of Montreal.
 **Manager of L'Art Lapide Society, Montreal.

Spot welding is the best example of the resistance process, and is very serviceable where large quantities of similar parts are to be handled.

The arc process possesses some peculiar advantages, due to the fact that its rapidity of action serves to eliminate the large amount of expansion and contraction, which in some cases militate against the success of autogenous welding. The

successful application of the arc process depends largely on the type of apparatus, many of which have been designed, but all of which have not proved an unqualified success. The advantages of the arc process are sometimes offset by the changes which take place in the metal, the resulting difference between the welded region and adjacent parts being occasionally very marked in regard to such features as hardness, brittleness, and elongation.

The Thermit Process

This is strictly a chemical process, and depends on the fact that when powdered aluminum is intimately mixed with iron oxide and a small portion heated to a suitable temperature, the aluminum combines with the oxygen and releases the iron. This reaction is accompanied by intense heat, the iron being turned into a molten mass, which is available for use in a welding mould, as used in scoop welding. Although limited in application, its reliability and capabilities render it indispensable in certain classes of repair work.

Blow Pipe Processes

The general use of the blow pipe as a means of welding is of comparatively recent occurrence, but it has firmly estab-

lished itself as a recognized branch of industrial activity. Its most interesting features are the large variety of work which it can perform, and the nature

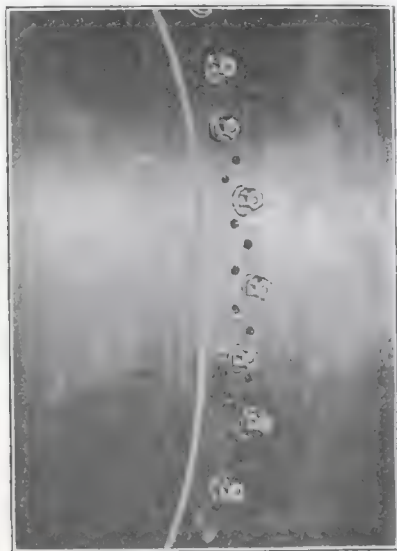


INSTALLING FIRE ZING COLES WITH WELDED JOINTS IN AN ARTIFICIAL ICE SKATING RINK

of different metals which can be united by means of it.

Comparatively little expense is involved in the installation of a plant for any particular line of work, while the fact that this process alone is capable of use on cast iron, steel, aluminum, copper, brass, bronze, etc., renders it unique among welding processes.

Although several combustible gases



PATCH WELDED IN.



PATCH CUT OUT

have been proposed for use in the blow pipe, experience has shown that acetylene gas is the most suitable.



BROKEN PRESS FRAME

Oxy-Hydrogen Flame

The possibilities of oxygen and hydrogen for blow pipe work were first tried out on a commercial scale in 1901. The combustion of hydrogen in oxygen results in the generation of a large amount of heat, 350 British thermal units being released for every cubic foot of hydrogen consumed. At the same time, a proportion of water is formed in the shape of vapor.

Theoretically, two volumes of hydrogen and one volume of oxygen are neces-

ary for perfect combustion. Practically, a flame of such composition is unsuitable for welding, due to the presence of water vapor, which is decomposed by contact with the hot metal; the oxygen combines with the metal to destroy its quality and impair the reliability of the weld. This action may be avoided to some extent by using an excess of hydrogen, in some cases 4 to 1, but this waste is accompanied by a lower flame temperature, so that except for very light sheet steel work the use of the oxy-hydrogen flame is almost discontinued.

Acetylene Gas

The use of acetylene gas had also been proposed in 1901, and its economy of operation, combined with its wide field of application, has resulted in its universal adoption by autogenous welders.

Acetylene is an endothermic gas which gives 1,630 British thermal units per cubic foot, 270 of which are due to the heat of dissociation. By weight, acetylene consists of 92.3 per cent. carbon and 7.7 per cent hydrogen. When one volume of acetylene is burned with one volume of oxygen, carbon monoxide and hydrogen are formed, and burn in the shape of a small bright cone in the centre of the flame. Towards the outer part of the flame these bodies combine with a portion of the oxygen of the atmosphere, presenting a different appearance from the central cone.

While $2\frac{1}{2}$ volumes of oxygen are theoretically necessary to burn one volume of acetylene, only one volume of oxygen need be supplied to the blow pipe, the atmosphere supplying the balance. The large proportion of carbon monoxide and free hydrogen in the oxy-acetylene flame have a reducing action, which renders the flame perfectly neutral and non-injurious to the work.

Autogenous Welding

The use of combustible gases to generate heat in such a manner that it can



PRESS FRAME REPAIRED

be applied locally with a blow pipe or torch is the distinguishing feature of autogenous welding. The remarks which follow are based on the use of acetylene gas, combined with oxygen.

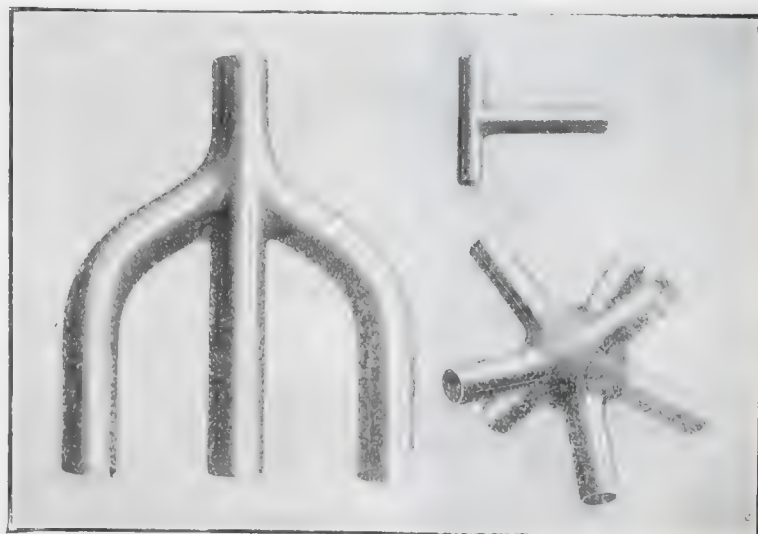
Oxy-acetylene welding is the art of so applying the heat of combustion to the work that a welding temperature is quickly obtained and maintained until the material is in a state of fusion, which then permits the union of surfaces or parts, the building up of areas, filling of cavities or hollows, the removal of metal, and cutting apart of various shaped bodies. Steel plates up to $1\frac{1}{2}$ inches in thickness and round or square bars up to 6 inches in diameter can be welded with the blow pipe without alteration to the chemical or physical characteristics of the material.

Oxy-Acetylene Equipment

The necessary equipment consists of a

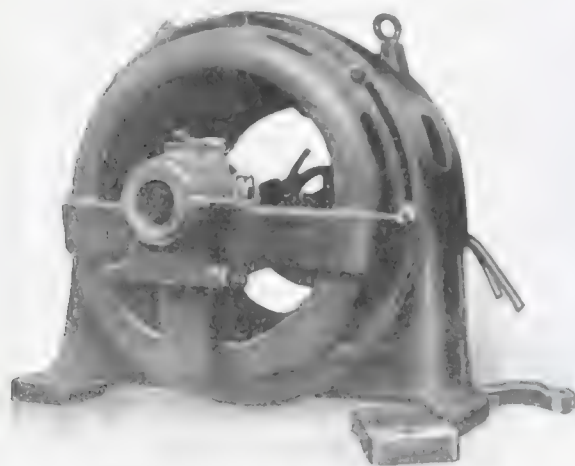


HEATING WITH BLOW PIPE TO REMOVE PROPELLER



BUILT UP COPPER PIPES

blow pipe with various size nozzles or burners, and a supply of oxygen and acetylene, the two gases being compressed in small cylinders and carried in steel tanks or cylinders.



Model 8 (Type of portable acetylene)

Compressed oxygen is readily obtainable in most industrial centres, while tanks containing acetylene are familiar to every automobile user. These tanks contain a porous substance saturated with acetone, which is a liquid dissolving the gas. The porous substance absorbing acetylene gas when supplied under pressure. As a result of this a greater quantity of gas can be stored at a less pressure, and in smaller space than when compressed alone. Generators are also used in which the acetylene gas is formed by the action of water on calcium carbide. They are desirable in large permanent installations, but for general work, the portable plant has many advantages.

Repair Work

The most widely known field of work

ing is in repair work. In many cases repairs can be made on the spot, thus saving the expense of hauling away the damaged part and bringing back a new one.

It is owing to the none-stop nature of the portable acetylene plant more than the direct savings due to repairing instead of replacing.

Consideration must be given to all these features before deciding that a job can be profitably performed by welding. When heavy sections have to be operated on, the cost increases rapidly, while the effects of expansion and contraction have to be

carefully observed, and guarded against by various methods and devices.

Cast Iron

With suitable equipment and materials, a capable operator can weld cast iron parts, the joints between which will have a strength of more than 100 per cent. of the original material. This is due to the use of feed rods of better quality material than the work. In order to avoid hardness in the welds it is necessary to use feed rods rich in silicon, i.e., about 5 per cent., and take all precautions against too rapid cooling.

Cast iron, having no elongation, is not suited to withstand stresses produced by unequal heating, and in most cases it is necessary to pre-

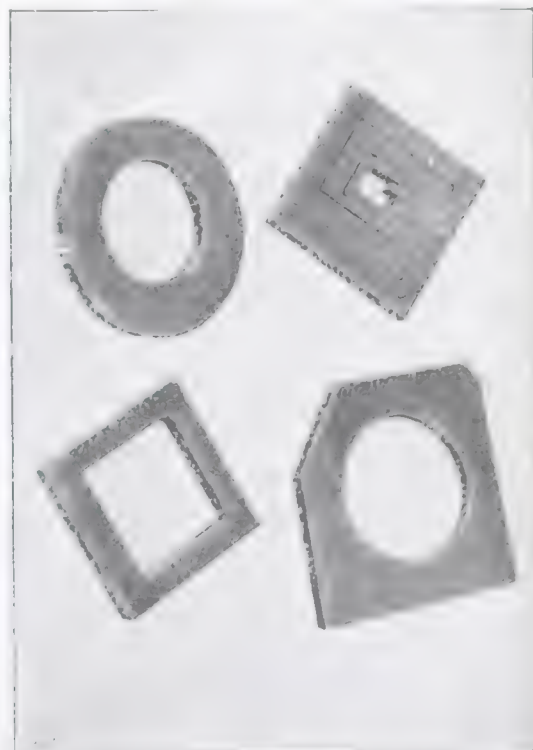
heat the work before welding. Even preheating does not always overcome this trouble with cast iron and the operator is required to insure the production of good work.

Steel

A good weld on steel should always show above 85 per cent. of the original strength. The mere fact that an operator fuses a piece of feed rod and allows the drops to fall on comparatively cool metal does not constitute welding. It is only adhesion. A careful welder will have all surfaces at the required temperature, and will use the feed rod in such a way as to ensure



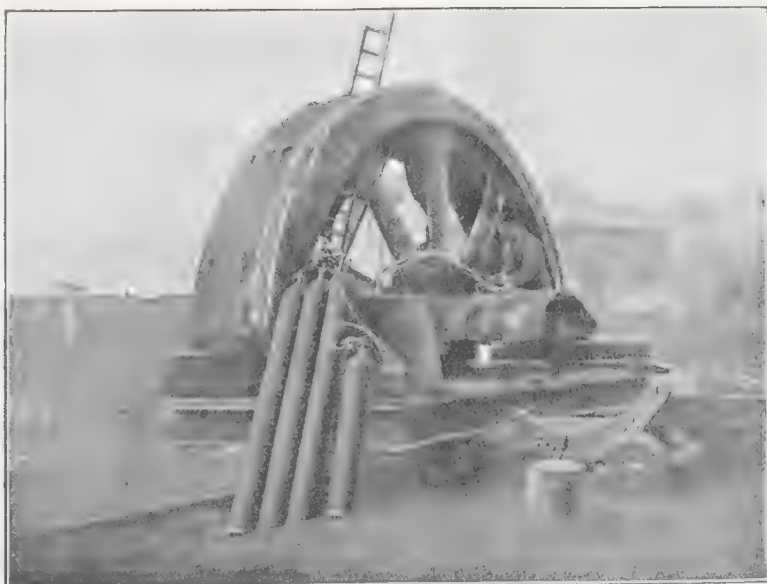
Model 10 (Type of portable acetylene)



EXAMPLES OF WELDING DONE WITH PORTABLE ACETYLENE BLOW PIPE



REMOVING RUST WITH BLOW PIPE



CUTTING OFF HEAVY RISER

flame, by the proper use of the hammer at the right moment he will improve the grain of the metal, and by further use of the blow-pipe, he can so anneal the work that the efficiency of the joint may be as high at 95 per cent.

In addition to cast iron and steel, oxy-acetylene welding is largely used for welding brass, bronze, copper, aluminum, and other metals. Its use in cutting up structural work such as bridges and buildings in course of demolition is a very great saving of time over the old laborious hand cutting. After heating a suitable spot on the plate or beam to melting point, the acetylene gas is turned off, and a stream of pure oxygen is played on the heated metal causing it to melt and at the same time generate enough heat to allow the action of the oxygen to be continued along the desired line until the piece is cut through.

The removal of risers and feeders in foundry work is an everyday application of the process.

Manufacturing Applications

The application of autogenous welding to the making of steel barrels, tanks, etc., has been carried out with considerable success, but a large field of usefulness has so far only been touched. For articles made of plate up to $\frac{3}{8}$ inch thick it is very suitable, making a perfectly

tight joint which requires no caulking, is cheaper than riveting, and presents a better appearance.

In the manufacture of steel and iron pipes, flat strips are rolled to shape and welded by an automatic machine. This process is used in making water and gas pipes, bicycle tubing and bedsteads.

By means of oxy-acetylene welding, water, steam and gas pipes have been reduced in thickness as threaded joints are eliminated. Many installations of complete systems have been made without a screwed joint, the joints being welded while in position. Very few fittings are required, as a hole can be cut in a pipe and a branch welded on. The welding of flanges to pipe is also another great advantage.

The construction of heating boilers by welding together parts made of steel plates, has been greatly developed also the construction of radiators by the same method. Other applications which can be made include the following:—

The construction of steel cars, doors, frames, window sashes, etc.

Poppet valves for internal combustion engines.

Cement pipe lines where the liners are shells of light gauge steel.

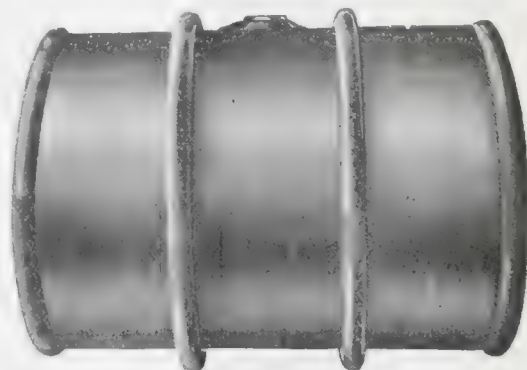


CUSTOMS RETURNS HIGHER

AN increase of over two millions in Customs receipts is the healthy condition shown by the figures issued for September by the Department of Customs.

For the month, receipts totalled \$8,029,665, as compared with \$5,919,273 in September of last year, or an increase of \$2,110,391. For the six months, ending September 30, of the present fiscal year, receipts have been \$44,760,830, as compared with \$43,044,913, an increase of \$1,715,917.

This indicates that for the first half of the 1915 financial year, at least, the Customs revenues have been swelled by the tariff increases of last season to the extent of almost two millions. As it usually takes some time before Customs taxes have their due effect, the showing for the last half of the year is expected to be even better. It must be remembered in comparing the first six months of this year with those of 1914 that the

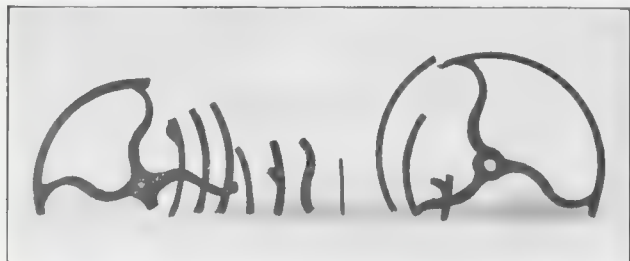


WELDED STEEL BARREL

latter period includes but two months of war.



The pressure in the chamber of a gun at the moment of discharge of the shell is about 25 tons per sq. in.



PARTS OF BROKEN PULLEYS SUCCESSFULLY REPAIRED WITH BLOW-PIPE

EDITORIAL CORRESPONDENCE

Embracing the Further Discussion of Previously Published Articles, Inquiries for General Information, Observations and Suggestions. Your Co-operation is Invited

MOLDING A LARGE ACCUMULATOR BASE

By J. H. R.

THE St. Lawrence Iron Foundry Co., of Montreal, Que., has made a specialty of supplying all kinds of iron castings to the trade and at the present time remodelling a portion of their plant and equipping same for the

constructed for the Montreal Ammunition Co., by the Canadian Boomer & Boscchert Press Co., of Montreal. The accumulator, when completed will furnish a pressure of 1,500 pounds per sq. inch to hydraulic presses engaged in the drawing of shell cartridge cases. The casting will consist of 25 per cent. steel, which is obtained from the use of the

the sand of uniform density at all points. As there was no base to the pattern the openings between the ribs made it easy of access.

When the spaces between the ribs were completely rammed, the surplus sand was removed by sweeping the surface above the ribs leaving the space for the metal at the base of the casting. The sand having been levelled off, the pattern

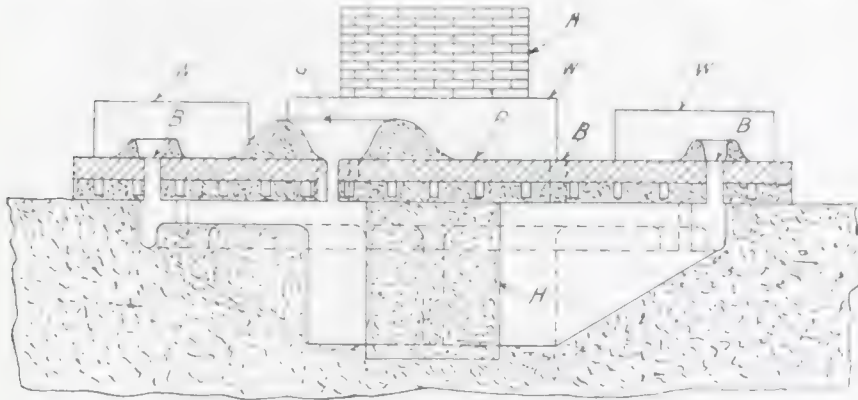


FIG. 1. SECTION THROUGH GREEN SAND MOLD FOR ACCUMULATOR BASE

machining of 4.5 high explosive shells. They will, however, continue to develop the foundry end of their business, and in order to give your readers an idea of the nature and scope of same, the molding features connected with the production of a large accumulator base casting are here detailed and illustrated.

This casting, which will weigh in the

discarded shells and shell ends from shell making plants. The pattern for this base casting was of the skeleton type, being quite satisfactory in view of the fact that only one casting would be required.

Preparing the Mould

The mould was prepared as shown in Fig. 1. A pit was dug in the floor and

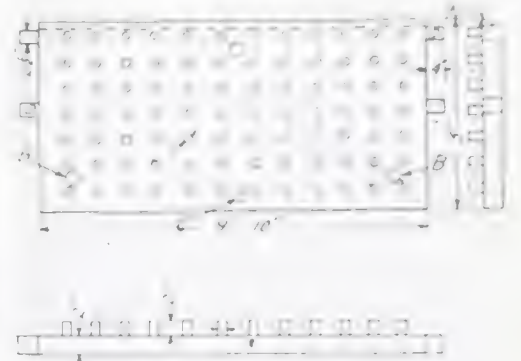


FIG. 3. COPE PLATES

was carefully removed, the moulder and his helper afterwards cleaning up and smooth facing the various surfaces. A view of the mould at this stage is seen in Fig. 2. As it was not thought advisable to construct a special cope the method shown in the figure was adopted as this had proved satisfactory in former cases.

Special Cope Plates

For plates of cast iron weighing

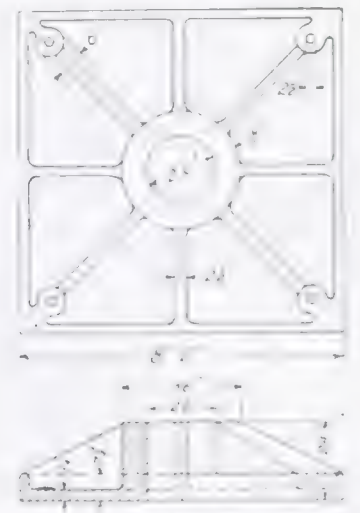


FIG. 2. ACCUMULATOR BASE



FIG. 2. COMPLETED GREEN SAND MOLD FOR ACCUMULATOR BASE

neighborhood of 17,000 lbs., is for the base of one of the largest accumulators yet built in Canada, and which is being

the pattern set into it, and levelled up. Green sand was shoveled in and thoroughly rammed, care being taken to have

about 2 tons each and similar to that shown in Fig. 3 were cast. Pins A which protruded about two inches from

the main plate and were about one inch in diameter were placed irregularly about the surface for the purpose of retaining a layer of sand spread over the surface and which was rammed up and surface levelled by placing the plate in the framework shown to the right is Fig. 6. This thickness of sand amounted to about $2\frac{1}{2}$ inches. Cored holes B were put into the plate so as to come directly over the corners of the casting and be just outside of the boss as shown in Fig. 4, which is a sketch of the finished casting. The holes C were for inserting eye-bolts for convenience in handling, while the lugs D, were used for turning the plate over when the sand facing was in place.

Arrangement of Mould

The arrangement of the mould for producing these plates, two of them being used, is shown in Fig. 5. A space sufficiently large was cleared on the floor and the sand rammed to an even density. A skeleton frame was used to make the required plate dimensions which were about two inches thick by nine feet ten inch by five feet. When placed over the mould as shown in Fig. 1 there was a bearing of 10 inches all around the edge.

The object of making two plates in place of one was for convenience in handling. It will be noticed that the plate edges which come together in the centre of the mould as shown at N are

bevelled. This is for the purpose of securing a good close joint with little labor. When the plates are butted, the trough formed by the two bevels is rammed with a little waste and sand thus

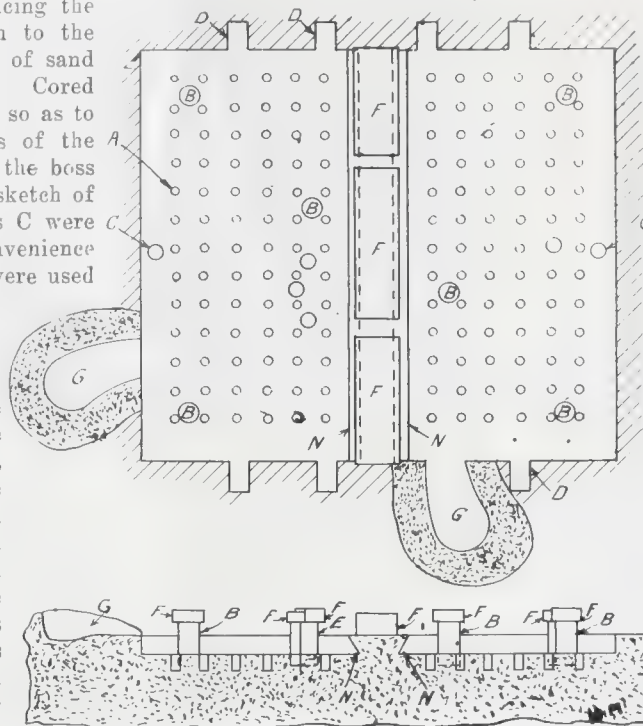


FIG. 5. GREEN SAND MOLD FOR COPE PLATES

securing a close joint and avoiding fins or burrs, which would be liable to appear if the plates were left the full thickness at their edges.

The layout of this mould is shown in

Fig. 5. The cores B are for the risers while those at E were for the runners from the pouring basin when placed over the mould Fig. 1. The pouring basins G were placed to one side of the moulds.

The cores were prevented from shifting by means of the weights F. A view of the mould in readiness for pouring is shown in Fig. 6.

Accumulator Base Casting Mould

A sketch of the mould for the accumulator base casting is seen in Fig. 1. After the mould is prepared as per Fig. 2, the plates with their facing of sand are placed in position and the basins for pouring and risers arranged. The weights W, together with that of the plates, amounted to about ten tons. The plates at the centre rested on the 20-inch cove H, which extended up level with the base of the cutting.

Pouring

The largest ladle in the shop which was handled by a 5-ton "Whiting" crane had a capacity of only 5 tons. It was, therefore, necessary to provide some means of continuous pouring. The brick bosh A shown at the rear of Fig. 1 was constructed of sufficient size to hold about 4 tons of iron and this was filled with molten iron while the 5-ton ladle



FIG. 6. GREEN SAND MOLD FOR COPE PLATES IN READINESS FOR POURING.

was being poured. When the 5-ton ladle was emptied, the bosh was tapped, and while the metal was running in the ladle was being refilled.

One of the problems which confronted the foundry foreman was the removal of the casting after cooling, as the 5-ton crane was not deemed capable of lifting a casting which was expected to weigh between 8 and 9 tons. One side was raised at a time by which process it was gradually turned over on to a track prepared with special rollers. It was then removed to the Canadian Boomer & Boscchert Co. shops across the road in which the accumulator was to be erected and completed.



CONCERNING BELT SLIPPAGE

By N. G. Near.

ANSWERING R. McLaren, who says he is "still unconvinced that a slipping belt necessarily means fuel waste," I do not know how I could explain the matter

for a mass, a acceleration given to the 33,000 pound weight.

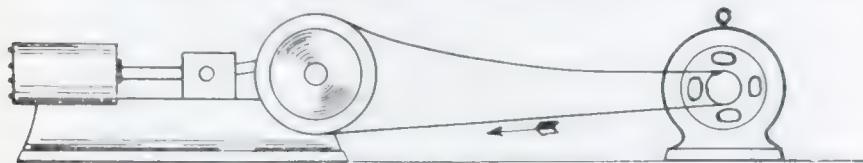
It is, therefore, evident that should the engineer so choose, and should he happen to have that amount of energy available, he could expend an additional 1,000 h.p. or more in raising the weight.

It is true, as Mr. McLaren says, that running the engine faster or increasing the tension in the cables, will accomplish the desired end, and either operation will require more steam.

No, I would hardly claim that it is easier to climb a stair than to walk along a level floor. When you climb a stair you store potential energy within yourself, and it requires work to do that, but when you walk along a level floor, the summation of all the work done by one's self on one's self is zero. No work is done at all.

The Gas Engine Example

As for the gas engine, let me explain in detail why each per cent. of belt slip



CONCERNING BELT SLIPPAGE

When the weight is 33,000 lbs. and the belt slips 100 per cent. the work done is 33,000 ft. lbs. per second.

more simply than by use of the hoisting engine.

This is the principle upon which all Prony brakes are made, and this principle is used in running all "Prony" brake tests. Therefore, when the slip of a belt becomes 100 per cent., the belt will not move the driven pulley at all and the whole arrangement becomes a veritable "Prony" brake.

With reference to the hoisting engine, Mr. McLaren says:

"We will assume, that the weight is suspended from the drum by a cable and that the cable slips on the drum, the tension being adjustable in a manner similar to the brake band. We will assume also that the drum has a radius of 1 ft. and that it turns at the rate of 100 r.p.m. The power required to hold the weight stationary would be $2 \times 1 \times 3.1416 \times 100 \div 33000 = 628.32$ h.p. How then would he cause the weight to rise?"

It is a fact that the weight of 33,000 pounds cannot be raised without some additional power because nothing can be set in motion from rest without the exertion of some force acting through distance. An additional hundredth, thousandth or millionth of a horse power will therefore be sufficient to raise the weight. To raise a weight of 33,000 lbs. may require an additional 25 or 50 h.p., and this can easily be computed from the familiar formula, $F = Ma$, where F

on gas or gasoline engines represents a fuel loss of more than one per cent. I refer here only to gasoline engines that fluctuate violently.

The tension in the belt here is 1,000 pounds only because the load does not require a greater tension. Should the load be greater, the tension would of itself become more than 1,000 pounds, and there would be no slip, but, there is a limit. Let us suppose that the belt slips at 1,100 pounds. This tension is reached when the engine "jerks," due to the sudden explosions, and, during the instant of slip, the tension of 1,100 pounds is doubtless maintained. More energy is being taken from the engine, then, during the instant of slip than during an instant of normal pulling, and I therefore naturally conclude that the full consumption is greater, due to slip, than if there were no slip.

The best way to eliminate this loss is to make the fly-wheels so heavy that the fluctuations will not be violent enough to cause belt slip, or, the explosions may be made frequent enough to produce the same effect.

I trust I have now made myself perfectly clear.

POINTS ON RUBBER BELT CONSTRUCTION

BRIEFLY, the process of belt manufacture is as follows:—Cotton duck, of

such weight and strength as is required for the work to be done, is frictioned or coated with rubber upon the calender. The quality of the rubber, like the weight and strength of the cotton, varies according to the nature of work to be done. The frictioned fabric is then cut into definite widths, according to the width of the finished belt, after which the plies of fabric are built up either by folding or laying ply upon ply or a combination of both.

After the belt is built up and the cover applied, a seaming strip of high-grade rubber is laid over the outside joint in order to weld this joint firmly together and prevent separation or opening up of the seam. The raw belt is then rolled upon a shell and given a slight cure in open heat in order to vulcanize the edges. After the "first cure" the belt is carefully vulcanized between the polished plates of a powerful hydraulic press. The rubber is forced into the duck, and the whole belt becomes perfectly smooth and firm. Just prior to vulcanizing, the belt is stretched under great pressure, thus minimizing stretch when the belt is put in actual use.

Rubber belts should be run at not less than 200 ft., nor over 5,000 ft. a minute, a good average being 2,000 ft. Shifters should not be used, as, once the edges of rubber belting are worn through, the plies readily separate. All animal oils and greases are injurious to rubber belting.—Practical Engineer.



BRITISH EXPORTS TO CANADA DECREASE

THE following are the values of goods from London, of trade between Canada and Great Britain in the undermentioned articles during August:—

Imports From Canada

	Aug. 1915	Aug. 1914
Wheat	228,248	27,706,911
Wheat gluten		
flour	238,132	147,889
Barley	78,084	85,797
Oats	20,484	97,200
Bacon	278,791	129,404
Hams	40,000	21,000
Cheese	20,000	20,000
Canned salmon	100,000	100,000
Canned lobsters	28,964	53,622

Exports to Canada

	Aug. 1915	Aug. 1914
Wool	1,000	1,000
Paper	100	100
Wire	983	2,948
Galvanized sheets	5,118	18,241
Tinned plates	2,099	5,401
Steel bars	4,494	7,134
Pipe	849	4,000
Cotton	1,100	9,000
Hardware	2,079	16,790

PROGRESS IN NEW EQUIPMENT

A Record of New and Improved Machinery and Accessories for the Machine, Pattern, Boiler and Blacksmith Shops, Planing Mill, Foundry and Power Plant

SHELL MACHINERY IN FRANCE

THE fact that the French nation is mobilized to a man for the purpose of producing shells as well as actual fighting is of particular interest to our readers at the present moment. Our allies were alive to the necessity for extraordinary shell production long before it was realised by ourselves, and the efficient manner in which munitions manufacture was tackled and made a national problem has already earned the admiration of not a few British engineers.

Previous to the outbreak of hostilities, the firm of Alfred Herbert, Ltd., of Coventry, Eng., enjoyed a widespread business with various European nations, but since then, their activities have been limited to certain countries. One of their travelling operators in France has done excellent work in the designing of shell machinery which has been made by the firm's customers in France. His description of conditions and methods which we reproduce are from the house organ of Alfred Herbert Ltd.

In the first place the various works in the country were grouped, the shops in each group working in conjunction with each other, while an expert engineer was put in control of the group.

Contracts were then given out to the controller of each group, who divided and sub-divided the work amongst the establishments under his control, accord-

but not enough to undertake a large contract for shell bodies. These automatics were thereupon transferred to another shop which had more of the same

any and every machine they could lay their hands on.

Although we are not allowed to mention names, it is by the courtesy of the

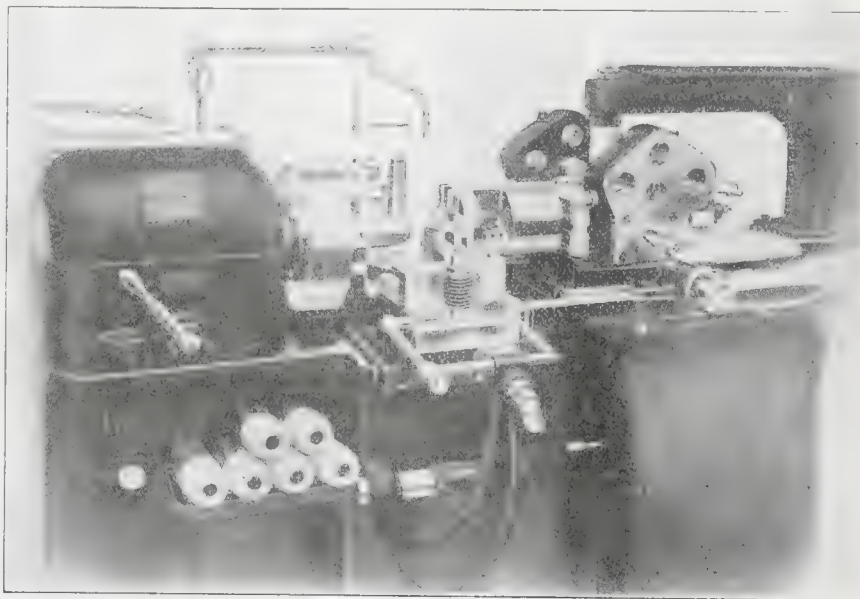


FIG. 2 ROUGHING BOX TOOL AND PROFILER

type, while the latter sent some of its smaller machines to the first.

With a large number of automatic machines, the second shop could turn out a large number of shell bodies in an efficient manner, while the first shop was put into better shape for handling fuses and grenades.

At the same time, it was no easy matter to switch all these works over from building motor cars, locomotives, etc., to shell and gun production. Tools were a great problem, but it was not allowed to remain a problem long. One or more works in each group was told off to act as a sort of tool room to the rest, a plan that has worked very satisfactorily.

controller of one of the aforementioned groups, that we are permitted to publish the accompanying illustrations with particulars of the tools used for producing 75 mm high explosive shells on our Nos. 4 and 6 Automatic Turning Machines.

The French 75 mm high explosive shells are made from forgings. These are first rough turned and finish bored previous to a closing-in operation. After the nose has been closed-in the shell bodies are delivered to the Automatic Turning Machines for the finishing operations. It should be noted that during the first rough-turning operation, the boss at the closed end of the shell is turned to a definite size with limits either way of 0.008 inches.

This boss is made use of after the closing-in operation, for holding the shell body true in the chuck.

In the first operation on the Automatic, the shell body is held in soft jaws, mouth outwards, while a special draw-in chuck fitted in the spindle, grips and holds true the boss on the end of the shell.

The shells are located by the bottom of the hole, using a device that gives a definite length from this point to the front of the chuck jaws.

The box-tool shown in position in Fig. 2 first turns the shell body to about half way down. The special radius tool

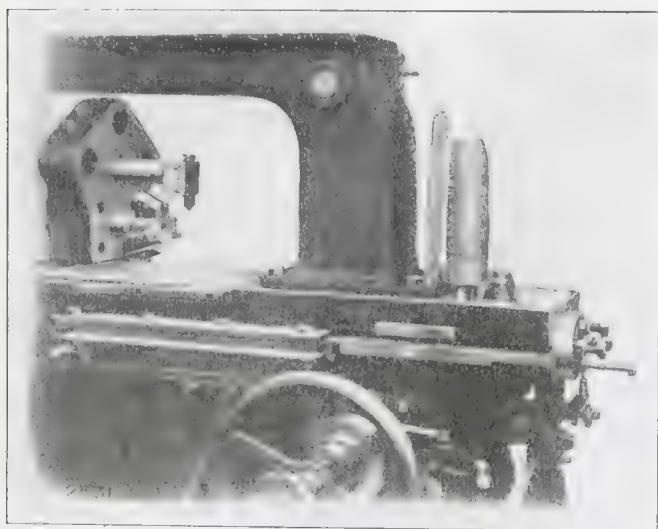


FIG. 1 75 MM H. E. SHELL WITH SECTION CUT FROM NOSE

ing to the capacity of each shop. Machine tools changed hands according to the work given out; for instance, a particular shop had a few automatic machines,

Automatic machines are not being used for turning and boring shell bodies to any great extent in this country, but our French allies have turned to account

fixed to the front cross-slide is then fed forward to the roller and the roller is moved to the next turret face. At the same time the mouth is retracted. This operation is shown in Fig. 3.

This illustration also shows the special reaming tool used for boring and dovetailing the mouth. Owing to the necessity for fitting the profiling tool to the front cross-slide, this reaming tool has to be fed by the rear cross-slide. It

then passes into the front cross-slide and is fed forward to the roller. The finish-turned nose effectively prevents the shell from running out of truth.

The roughing operation is then performed with tools in the turret. The roughing tool is fed by the front cross-slide and the outside of the shell between the band groove and the closed end is finish-turned by means of the

Re-setting the tools after sharpening takes 10 minutes for the roughers and 15 minutes for the finishers. Thus, for a total output of about 38 shells per day of eleven hours per machine.

It is found that the roughing tool can be used for the roughing of the inside of the shell for the production of 75 mm shells.

For profiling the nose however, it is necessary to take two cuts, roughing and finishing. These two cuts take place simultaneously, a double slide arrangement being mounted on the turret, the two slides being guided by formers held in the front and rear cross-slides.

All the operations of the machine are completed in 20 minutes.



GLASSES FOR EYE PROTECTION

DEMANDS for adequate eye protection are becoming more insistent with the widespread use of apparatus for such processes as oxy-acetylene welding, electric furnaces of various types, and all metal manufacturing processes which involve the exposure of operators to direct heat and light rays of considerable intensity. In a report on investigations regarding the provision of suitable glasses for eye protection, in a recent issue of the Iron Trade Review, M. Luckiest, of the National Lamp Works, presents a number of interesting facts relative to light and its control.

The energy which is radiated from all hot bodies into the surrounding media is sent forth in pulses or waves. In a manner similar to that of a wireless receiving station, the eye is physically capable of perceiving pulses or waves of a certain definite frequency or length, name from 0.39 micron to 0.75 micron, a micron being a small unit of measure-

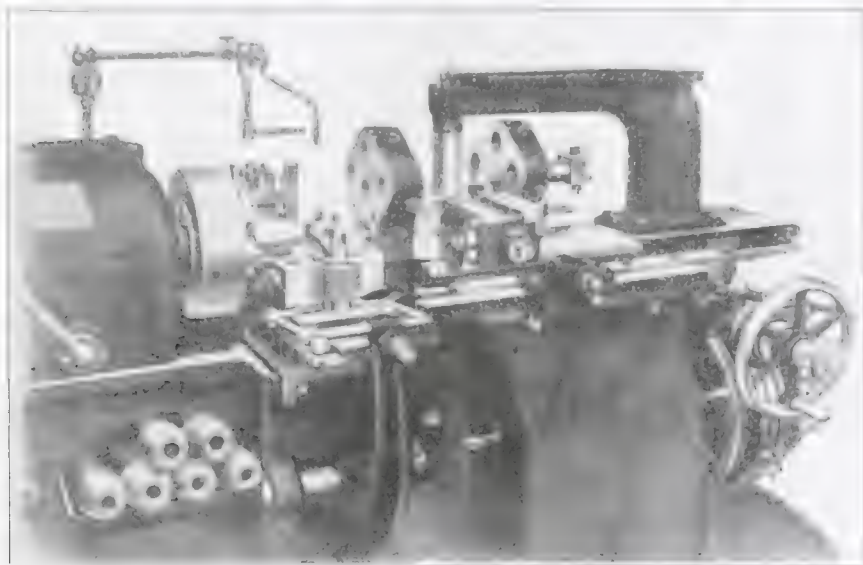


FIG. 3. PROFILING TOOL IN OPERATION

was, however, found necessary to have the tool inverted so that the spring and lever feed reversing mechanism seen in the illustration, Fig. 3, was adopted, and works very well.

In the second operation the rear portion of the shell is finished. Owing to the manner in which the lengthwise limits of the shell are specified, it was found impracticable to locate the shell by the mouth; the best way and the one adopted is to fit a bush in the machine spindle, boring this out to suit the profile of the shell nose. The shell is

then fed forward to the roller and a taper former carried in the front cross-slide.

The special knurling apparatus, seen in Figs. 4 and 5, is then used for serrating the bottom of the band groove.

The total time for both operations, including chucking and removing, is 17 minutes, the speed at which the shells are turned being approximately 66 feet per minute.

The roughing tools used last for about 30 shells, while the finishing cutters will machine 60 or more before they require re-grinding.

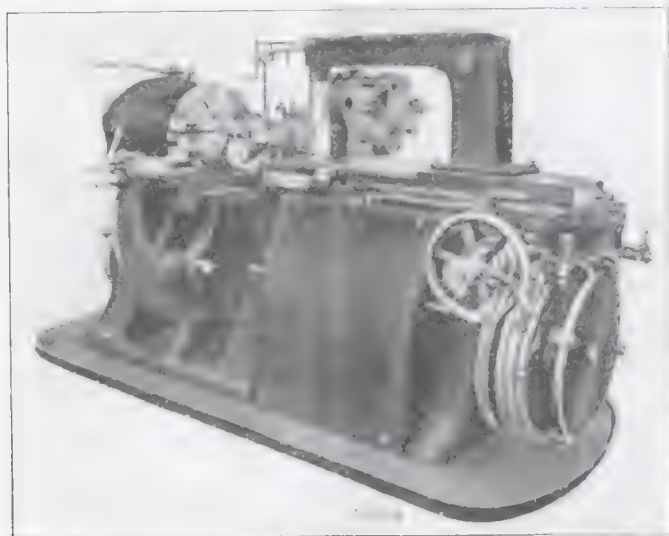


FIG. 4. TAPER TURNING AND KNURLING

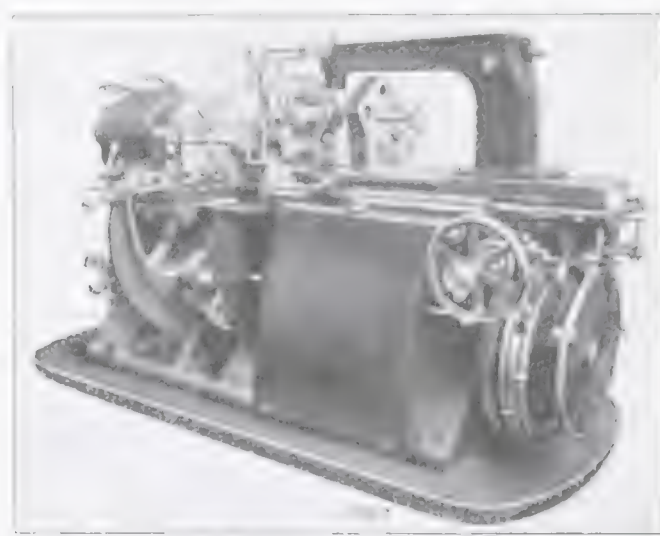


FIG. 5. SHOWING ROUGHING AND FINISHING TOOLS

of a millimeter. These limits constitute what is known as the region of visible spectrum.

Various Kinds of Rays

A hot body before it has reached a sufficiently high temperature to become luminous, gives off only what are commonly known as "heat" rays. As a matter of actual fact, all rays, whether visible or invisible, when absorbed by a medium, produce heat in that medium. As the temperature is increased, visible rays begin to emanate from the heated body. Further increases in temperature cause ultra-violet or chemical rays to emanate, the relative amount of the various kinds of rays emitted depending not only on the temperature of the body, but also on the substance of which it is composed.

The ultra-violet rays, that is those of shorter wave length than 0.39 micron, have no illuminating power. Certain varieties of them however are very active in destroying animal tissue. Complete data regarding them has not been obtained, but their harmful properties render it desirable to prevent any of these rays from entering the eye.

The retina or nerve surface of the eye can also be damaged by focussing excessive amounts of energy upon it. The selection of suitable glasses therefore involves two important features besides the provision of mechanical strength, viz. ultra-violet rays should be prevented from falling upon the eye, and the intrinsic brightness of the image thrown into the eye should be reduced to safe limits.

Very few glasses totally absorb the ultra-violet rays, and these are objectionable owing to the strong coloring in them. Yellow-green is the most desirable color.

Heat rays should be prevented from entering the eye because it is suspected that eye fatigue arises from the absorption of excessive heat. A desirable feature of the yellow-green glass is the

fact that variations of brightness due to the changes in temperature of incandescent bodies have the same relative appearance to the eye when using this glass, as when using uncolored glass. This fact accounts for the satisfaction experienced by welders when judging temperatures through these glasses.

Common smoke glasses simply reduce the amount of light, but do not absorb the unsafe ultra-violet rays. A variety of glass known as Akopos has been found which absorbs all of these rays, and can be combined with other glasses which are necessary to reduce undue brightness.

The appended table gives designations of safe glasses for various metallurgical processes.

Process.	Temperature degrees Fabs.	Safe glasses
Electric arc	6,200	Ak. + E 8
Electric arc under pressure	6,450	Ak. E 8
Oxy-hydrogen flame	3,000	Ak. + S 16
Oxy-acetylene flame	4,350	Ak. + S 20
Thermit weld flame	4,500	Ak. + S 20
Metal at tuyeres, and furnaces	3,500	Ak. + S 16
Metal at tuyeres	2,500 2,800	Ak. S 12
Blast furnace	2,500 2,800	Ak. S 12
Open hearth furnace	3,400 3,600	Cobalt Blue
Bessemer converter	3,400 3,600	Ak. + S 16
Open hearth in ladle	2,800 2,900	Cobalt Blue
Bessemer	2,800 2,900	Ak. + S 12
Soaking pits, low carbon	2,500 2,600	Ak. + S 12
Soaking pits, high carbon	2,200	Ak. + S 12
Gasholding furnaces	2,400 2,800	Ak. + S 12
Large gasholding furnace	2,400 3,200	Ak. + S 14

Ak. is an abbreviation for Akopos. E 8, S 16, etc., are optical designations for glasses of various shades.



TAPER FUSE THREADS

FUSE adapter bushes of naval pyddite shells have a taper hole in them cut 14.083 threads per inch. In the 6-in. shell, the length of this thread is about 2 in., and it is quite impossible to get anything like a satisfactory job on so long a thread by using taps, as each of

the cutting edges on the tap leaves a line where it stops cutting, and there is a danger of breaking the tap by running in too far.

For handling fuse adapter bushes on "Herbert" No. 4 capstan lathes, taper turning and chasing attachments, Fig. 1, are employed for cutting the thread. Previous to being chased, the hole is finished with taper reamers. The chasing attachment is shown in position in the illustration.

In action, the lathe spindle is run reversed and the chaser travels out from the work, operating in conjunction with the quick withdraw motion of the patent chasing saddle. The actual thread cutting is very rapid, taking approximately 40 seconds for a thread of 2 in. long, whilst the finish and accuracy obtained is excellent.

The corresponding male portion is screwed with a 1 1/4-in. "Coventry" patent self-opening diehead, fitted with the taper threading attachment shown in Fig. 2. The taper is governed by a former bar, which is forced outwards by a spring, and kept stationary by a stop held in the tool post of the lathe, while the diehead travels forward.

The advantage of cutting taper threads by this method is that the work is finished quite smooth and round, without the four ridges left by taper dies where they cease cutting. Herbert's Monthly.



As men improve in the service they render, their incomes should improve; they should be paid in proportion to the ability they show in the development of the business, whether it is an improvement in quantity or quality or both.

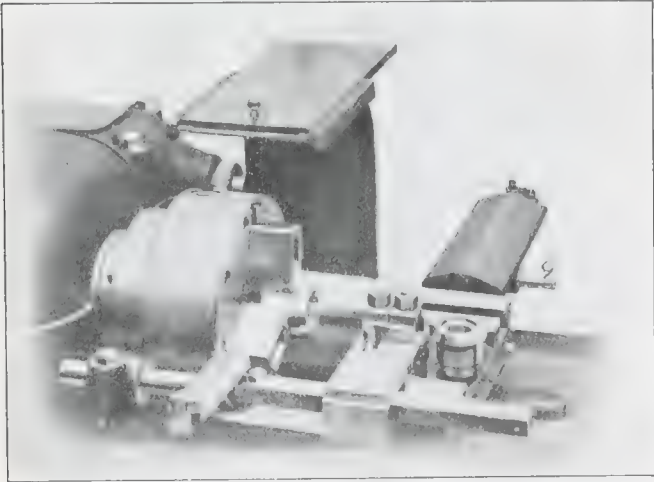


FIG. 1 TAPER TURNING AND CHASING ATTACHMENT

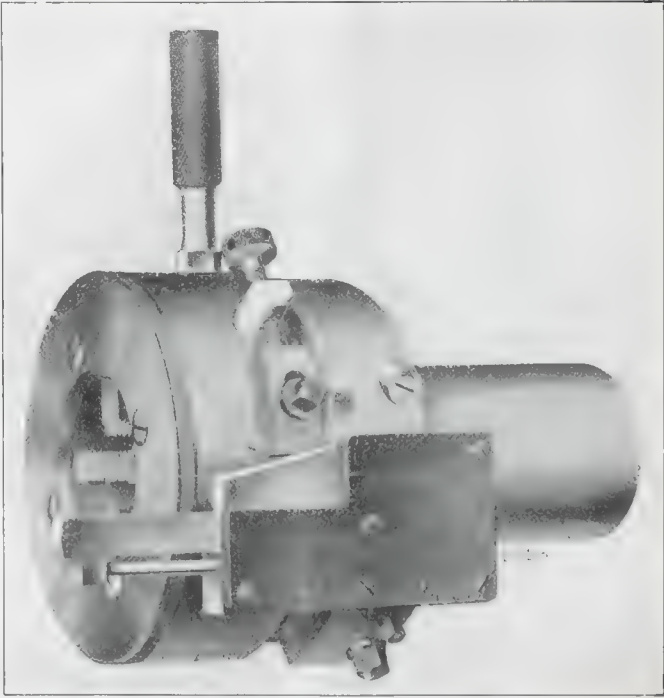


FIG. 2 "COVENTRY" PATENT SELF-OPENING DIEHEAD

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Vol. XIV. OCTOBER 7, 1915 No. 15

PRINCIPAL CONTENTS.

Producing Fuse Sockets and Plugs for Shrapnel Shells	341-343
How Metal Cools From Liquid to Solid	343-344
Zinc Discovered in Northern Quebec	344
Autogenous Welding With the Oxy-acetylene Blow Pipe	345-348
Editorial Correspondence	349-351
Mining in Large Canadian Bore	
Belt Sprockets	
General	354
Papers on Railway Bolt Construction	
Papers on Carriage Design	
Progress in New Equipment	354-354
Steel Mill and Press	
Taper Threads on Fuse Work	
Editorial	355
Science of Common Sense	
Selected Market Quotations	356-357
General Market Conditions and Tendencies	358-360
Industrial and Construction News	361

SCIENCE OR COMMON-SENSE?

THE beginning of the winter session of studies in the many technical schools throughout the country brings into prominent prominence every year, the subject of technical education. It is not very many years since discussions centered on the question, rather than the subject of technical education. People, especially employers, looked askance at the benefits which the rising generation of workers were supposed to be deriving from those institutions, and the practical value of the training, to the employer at any rate, was assessed at what, to the student, was a discouragingly low value.

Technical education, however, is a subject which has long and deeply engaged the attention of the thoughtful and the statesman. It is a subject which has been discussed in the most exhaustive manner by the most able and able minds of the age. The question of technical education is a subject which has been discussed in the most exhaustive manner by the most able and able minds of the age. The question of technical education is a subject which has been discussed in the most exhaustive manner by the most able and able minds of the age.

By a peculiar coincidence, the recent meeting of the British Association for the Advancement of Science took place at Manchester almost simultaneously with the opening of the school in Toronto. As representing what might be termed the extremes of scientific knowledge the two events offer one of those contrasts which are characteristic of an age of advancement.

Knowledge feeds upon itself, and will not be suppressed. Ambition is the fruit of knowledge and a nation with no ambition is destined to ultimately sink into oblivion. Unguided ambition becomes recklessness, and when indulged in on a national scale induces catastrophe.

Professor Arthur Schuster, F.R.S., delivered his presidential address to the British Association on the subject of "The Common Aims of Science and Humanity." Although a man of German extraction, his deservedness of such a high honor was fully recognized by the authorities, and the subject matter of his address discloses a mind bereft of all traces of "kultur" and possessed of that receptive, analytical and constructive ability which is truly characteristic of the British scientist.

If it were possible to speak individually to the many thousands of young minds who at the present moment are digging into the rudiments of science with all the enthusiasm born of youth and novelty, advice for each one could be found in Dr. Schuster's Address.

In discussing the question of scientific success, he quotes a previous president who used these words regarding the qualifications necessary to make a man a great scientist: "But, I hear someone say, these qualities are not the particular attributes of the man of science, they may be recognized as belonging to almost everyone who has commanded or deserved success, whatever may have been his walk in life. That is so. That is exactly what I would desire to insist, that the men of science have no peculiar virtues, no special powers. They are ordinary men, their characters are common, even commonplace. Science, as Huxley said, is organized common-sense, and men of science are common men drilled in the ways of common-sense."

The student who wishes to attain success and all the happiness that accompanies the attainment of objects sought, will find his path smoothed, his interest sustained, and his accomplishments increased just so long as he remembers that his successes must be based on common-sense.

We commend a study of the Address to all thoughtful students at this time, and offer these few lines from it as representing sentiments which are worthy of assiduous cultivation:

"...the object of science is to economize thought, just as it is the object of a machine to economize effort. Logically, this definition is justified, and it may be the best that can be given, if we prefer using a technical expression to confessing an emotional feeling. But why should we do so? Is it not better to recognize that human intelligence is affected by sentiment as much as by reasoning? It is a mistake for scientific men to dissociate themselves from the rest of humanity by placing their motives on a different, and at the best only superficially higher level."

SELECTED MARKET QUOTATIONS

Being a record of prices current on raw and finished material entering into the manufacture of mechanical and general engineering products.

PIG IRON.

Grey forge, Pittsburgh	\$14 70
Lake Superior, charcoal, Chicago	15 75
Ferro Nickel pig iron (Soo)	25 00

Montreal. Toronto.

Middlesboro, No. 3	22 00	.....
Carron, special	23 00	.....
Carron, soft	23 00	.....
Cleveland, No. 3	22 00	.....
Clarence, No. 3	22 50	.....
Glangarnock	26 00	.....
Summerlee, No. 1	28 00	.....
Summerlee, No. 3	27 00	.....
Michigan charcoal iron.	26 00	.....
Victoria, No. 1	23 00	20 50
Victoria, No. 2X	22 00	20 50
Victoria, No. 2 plain..	22 00	20 50
Hamilton, No. -	22 00	20 50
Hamilton, No. 2	22 00	20 50

FINISHED IRON AND STEEL.

Per Pound to Large Buyers.	Cents.
Common bar iron, f.o.b., Toronto	2.20
Steel bars, f.o.b., Toronto	2.20
Common bar iron, f.o.b., Montreal	2.20
Steel bars, f.o.b., Montreal	2.20
Twisted reinforcing bars	2.20
Bessemer rails, heavy, at mill....	1.25
Steel bars, Pittsburgh	1.30
Tank plates, Pittsburgh	1.30
Beams and angles, Pittsburgh....	1.30
Steel hoops, Pittsburgh	1.50
F.O.B., Toronto Warehouse.	Cents.
Steel bars	2.10
Small shapes	2.35
Warehouse, Freight and Duty to Pay.	Cents.
Steel bars	1.90
Structural shapes	1.95
Plates	1.95

Freight, Pittsburgh to Toronto.

18.9 cents earload; 22.1 cents less earload.

BOILER PLATES.

Montreal. Toronto.

Plates, 1/4 to 1/2 in., 100 lb. \$2 35	\$2 25
Heads, per 100 lb.	2 55 2 45
Tank plates, 3-16 in.	2 60 2 45

OLD MATERIAL.

Dealers' Buying Prices.	Montreal.	Toronto.
Copper, light	\$12 25	\$12 50
Copper, crucible	14 25	14 00
Copper, unch-bled, heavy 14 25	14 25	14 00
Copper, wire, unch-bled. 14 25	14 25	14 25
No. 1 machine compos'n 11 50	11 50	11 50
No. 1 compos'n turnings. 9 00	9 00	9 00
No. 1 wrought iron	9 50	9 00
Heavy melting steel	8 00	8 00
No. 1 machin'y cast iron 13 50	11 00	11 00
New brass clippings....	11 00	11 00
No. 1 brass turnings....	9 00	9 00
Heavy lead	4 50	4 50

Tea lead	\$ 3 25	\$ 3 50
Serap zinc	10 50	9 50

W. I. PIPE DISCOUNTS.

Following are Toronto jobbers' discounts on pipe in effect Aug. 27, 1915:

	Buttweld Black Standard	Gal. Lapweld Black Gal.
1/4, 3/8 in.	63	38 1/2
1/2 in.	68	47 1/2
3/4 to 1 1/2 in. ..	73	52 1/2
2 in.	73	52 1/2
2 1/2 to 4 in. ...	73	52 1/2
4 1/2, 5, 6 in.	70	49 1/2
7, 8, 10 in.	67	44 1/2
X Strong P. E.		
1/4, 3/8 in.	56	38 1/2
1/2 in.	63	45 1/2
3/4 to 1 1/2 in. ..	67	49 1/2
2, 2 1/2, 3 in.	68	50 1/2
2 in.	63	45 1/2
2 1/2 to 4 in.	63	48 1/2
4 1/2, 5, 6 in.	66	48 1/2
7, 8 in.	59	39 1/2
XX Strong P. E.		
1/2 to 2 in.	44	26 1/2
2 1/2 to 6 in.	43	25 1/2
7 to 8 in.	40	20 1/2
Genuine Wrot Iron.		
3/8 in.	57	32 1/2
1/2 in.	62	41 1/2
3/4 to 1 1/2 in. ..	67	46 1/2
2 in.	67	46 1/2
2 1/2, 3 in.	67	46 1/2
3 1/2, 4 in.	66	45 1/2
4 1/2, 5, 6 in.	63	42 1/2
7, 8 in.	60	37 1/2
Wrought Nipples.		
4 in. and under	77 1/2%	
4 1/2 in. and larger	72 1/2%	
4 in. and under, running thread. 57 1/2%		
Standard Couplings.		
4 in. and under	60%	
4 1/2 in. and larger	40%	

MILLED PRODUCTS.

Sq. & Hex. Head Cap Screws....	65%
Sq. Head Set Screws	65 & 10%
Rd. & Fil. Head Cap Screws....	45%
Flat & But. Head Cap Screws....	40%
Finished Nuts up to 1 in.	70%
Finished Nuts over 1 in. N.	70%
Semi-Fin. Nuts up to 1 in.	70%
Semi-Fin. Nuts over 1 in.	72%
Studs	65%

METALS.

Montreal. Toronto.

Lake copper, earload ...	\$20 00	\$19 50
Electrolytic copper	20 00	19 25
Castings, copper	19 75	19 00
Tin	39 00	38 00
Spelter	18 00	18 00
Lead	6 15	6 25
Antimony	35 00	35 00
Aluminum	52 00	55 00

Prices per 100 lbs.

BILLETS.

Per Gross Ton

Bessemer, billets, Pittsburgh...	\$24 50
Openhearth billets, Pittsburgh..	25 00
Forging billets, Pittsburgh	33 00
Wire rods, Pittsburgh	30 00

NAILS AND SPIKES.

Standard steel wire nails, base	\$2 40	\$2 35
Cut nails	2 50	2 70
Miscellaneous wire nails..	75 per cent.	
Pressed spikes, 5/8 diam., 100 lbs.	2 85	

BOLTS, NUTS AND SCREWS.

Per Cent.

Coach and lag screws	75
Stove bolts	80
Plate washers	40
Machine bolts, 3/8 and less....	70
Machine bolts, 7-16 and over....	60
Blank bolts	60
Bolt ends	60
Machine screws, iron, brass....	35 p.c.
Nuts, square, all sizes. 4 1/4 c per lb. off	
Nuts, Hexagon, all sizes. 4 3/4 c per lb. off	
Iron rivets	72 1/2 per cent.
Boiler rivets, base, 3/4-in. and larger ...	\$3.75
Structural rivets, as above	3.75
Wood screws, flathead, bright	85, 10, 7 1/2, 10 p.c. off
Wood screws, flathead, Brass	75 p.c. off
Wood screws, flathead, Bronze	70 p.c. off

LIST PRICES OF W. I. PIPE.

Standard. Nom. Diam.	Price per ft.	Extra Strong, Sizes Ins.	D. Ex. Strong, Price per ft.	Size Ins.	Price per ft.
1/8 in. \$.05 1/2		1/8 in. \$.12		1/2 \$.32	
1/4 in. .06		1/4 in. .07 1/2		3/4 .35	
3/8 in. .06		3/8 in. .07 1/2		1 .37	
1/2 in. .08 1/2		1/2 in. .11		1 1/4 .52 1/2	
3/4 in. .11 1/2		3/4 in. .15		1 1/2 .65	
1 in. .17 1/2		1 in. .22		2 .91	
1 1/4 in. .23 1/2		1 1/2 in. .30		2 1/2 1.37	
1 1/2 in. .27 1/2		1 1/2 in. .36 1/2		3 1.86	
2 in. .37		2 in. .50 1/2		3 1/2 2.30	
2 1/2 in. .58 1/2		2 1/2 in. .77		4 2.76	
3 in. .76 1/2		3 in. 1.03		4 1/2 3.26	
3 1/2 in. .92		3 1/2 in. 1.25		5 3.86	
4 in. 1.09		4 in. 1.50		6 5.32	
4 1/2 in. 1.27		4 1/2 in. 1.80		7 6.35	
5 in. 1.48		5 in. 2.08		8 7.25	
6 in. 1.92		6 in. 2.86		.....
7 in. 2.38		7 in. 3.81		.....
8 in. 2.50		8 in. 4.34		.....
8 in. 2.88		9 in. 4.90		.....
9 in. 3.45		10 in. 5.48		.....
10 in. 3.20		
10 in. 3.50		
10 in. 4.12		

COKE AND COAL.

Solvay Foundry Coke	\$5.75
Connellsville Foundry Coke	5.00
Yough. Steam Lamp Coal	3.83
Penn. Steam Lamp Coal	3.63
Best Slack	2.99
Net ton f.o.b. Toronto	

COLD DRAWN STEEL SHAFTING.

At mill	45%
At warehouse	40%
Discounts off new list. Warehouse price at Montreal and Toronto.	

MISCELLANEOUS.

Solignum, half and half	0.22 1/2
Putty, 100-lb. drums ..	2.70
Red dry lead, 100-lb. kegs, per cwt.	9.65
Glue, French medal, per lb.	0.18
Tarred slaters' paper, per roll ..	0.95
Motor gasoline, single bbls., gal. .	0.18
Benzine, single bbls., per gal.	0.18
Pure turpentine, single bbls.	0.64
Linseed oil, raw, single bbls.	0.72
Linseed oil, boiled, single bbls. ..	0.75
Plaster of Paris, per bbl.	2.50
Plumbers' Oakum, per 100 lbs.	4.00
Lead wool, per lb.	0.10
Pure Manila rope	0.16
Transmission rope, Manila	0.20
Drilling cables, Manila	0.17
Lard oil, per gal.	0.73
Union thread cutting oil	0.60
Imperial quenching oil	0.35

POLISHED DRILL ROD.

Discount off list, Montreal and Toronto	40%
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PROOF COIL CHAIN.

1 1/4 inch	\$8.00
5-16 inch	5.35
3/8 inch	4.60
7-16 inch	4.30
1 1/2 inch	4.05
9-16 inch	4.05
5/8 inch	3.90
3/4 inch	3.85
7/8 inch	3.65
1 inch	3.45

Above quotations are per 100 lbs.

TWIST DRILLS.

Carbon up to 1 1/2 in.	60
Carbon over 1 1/2 in.	25
High Speed	60
Blacksmith	60 and 5
Bit Stock	20
Centre Drill	20
Ratchet	20
Combined drill and c.t.s.k.	15

Discounts off standard list.

REAMERS.

Hand	25
Shell	25
Bit Stock	25
Bridge	65
Taper Pin	25
Centre	25
Pipe Reamers	80

Discounts off standard list.

IRON PIPE FITTINGS.

Canadian malleable, A, 35 per cent.; B and C, 35 per cent.; cast iron, 60; standard bushings, 60 per cent.; flanges, 60; flanged unions, 60; malleable bushings, 60; nipples, 60; malleable capped unions, 65.

TAPES.

Masterman Metallic, 50 ft.	\$2.00
Luffkin Metallic, 603, 50 ft.	2.00
Admiral Steel Tape, 50 ft.	2.75
Admiral Steel Tape, 100 ft.	4.45
Major Jun., Steel Tape, 50 ft.	3.50
Rival Steel Tape, 50 ft.	2.75
Rival Steel Tape, 100 ft.	4.45
Reliable Jun., Steel Tape, 50 ft. ..	3.50

SHEETS.

	Montreal	Toronto
Sheets, black, No. 28	\$2.70	\$2.70
Canada plates, dull, 52 sheets ..	3.15	3.15
Canada Plates, all bright ..	4.75	4.75
Apollo brand, 10 3/4 oz. galvanized ..	6.40	5.95
Queen's Head, 28 B.W.G.	6.00	6.25
Fleur-de-Lis, 28 B. W. G.	5.75	5.75
Gorbal's Best, No. 28 ..	6.00	6.00
Viking metal, No. 28	6.00	6.00
Colborne Crown, No. 28 ..	5.38	5.30
Pioneer No. 28	5.60	5.50

BOILER TUBES.

Size	Seamless	Lapwelded
1 in.	\$11.00	.....
1 1/4 in.	11.00	.....
1 1/2 in.	11.00	.....
1 3/4 in.	11.00	.....
2 in.	11.50	8.75
2 1/4 in.	13.00	10.50
2 1/2 in.	14.00	11.15
3 in.	16.00	12.10
3 1/2 in.	20.00	14.17
4 in.	25.50	18.00

Prices per 100 feet, Montreal and Toronto.

WASTE.

WHITE.

	Cents per lb.
XXX Extra	0.11
X Grand	0.10 1/2
XLGR	0.09 3/4
X Empire	0.09
X Press	0.08 1/4

COLORED.

Lion	0.07 1/2
Standard	0.06 3/4
Popular	0.06
Keen	0.05 1/4

WOOL PACKING.

Arrow	0.16
Axle	0.11
Anvil	0.08
Anchor	0.07

WASHED WIPERS.

Select White	0.08 1/2
Mixed Colored	0.06 1/4
Dark Colored	0.05 1/4

This list subject to trade discount for quantity.

BELTING RUBBER.

Standard	50%
Best grades	30%

BELTING—NO. 1 OAK TANNED

Extra heavy, wide and dull	10%
Standard	50 & 10%
One layer, No. 1	10%
Double layer, No. 1	10%

ELECTRIC WELD COIL CHAIN E.B.

1 1/2 in.	\$3.00
1 1/4 in.	6.25
5-16 in.	4.65
3/8 in.	4.00
7-16 in.	4.00
1/2 in.	4.00

Prices per 100 lbs.

PLATING CHEMICALS.

Acid, boracic .....	.15
Acid, hydrochloric .....	.05
Acid, hydrofluoric .....	.06
Acid, Nitric .....	.10
Acid, sulphuric .....	.05
Ammonia, aqua .....	.08
Ammonium carbonate .....	.15
Ammonium chloride .....	.11
Ammonium hydrosulphuret .....	.35
Ammonium sulphate .....	.07
Arsenic, white .....	.10
Copper sulphate .....	.10
Cobalt Sulphate .....	.50
Iron perchloride .....	.20
Lead acetate .....	.16
Nickel ammonium sulphate .....	.10
Nickel carbonate .....	.50
Nickel sulphate .....	.17
Potassium carbonate .....	.40
Potassium sulphide .....	.30
Silver chloride .....	.65 (per oz.)
Silver nitrate .....	.45 (per oz.)
Sodium bisulphite .....	.10
Sodium carbonate crystals .....	.04
Sodium cyanide, 127-130% .....	.35
Sodium hydrate .....	.04
Sodium hyposulphite (per 100 lbs.)	3.00
Sodium phosphate .....	.14
Tin chloride .....	.45
Zinc chloride .....	.20
Zinc sulphate .....	.08

Prices Per Lb. Unless Otherwise Stated.

ANODES.

Nickel .....	.47 to .52
Cobalt	1.75 to 2.00
Copper .....	.25 to .35
Tin .....	.45 to .50
Silver .....	.55 to .60
Zinc .....	.25 to .35

Prices Per Lb.

PLATING SUPPLIES.

Polishing wheels, felt	1.50 to 1.75
Polishing wheels, bullneck ..	.80
Emery in kegs .....	.41 1/2 to .06
Pumice, ground .....	.05
Emery, fine .....	.15 to .20
Tricoll composition .....	.04 to .06
Crocus composition .....	.04 to .06
Emery composition .....	.05 to .07
Rouge, silver .....	.25 to .50
Rouge, nickel and brass ..	.15 to .25

Prices Per Lb.

The General Market Conditions and Tendencies

This section sets forth the views and observations of men qualified to judge the outlook and with whom we are in close touch through provincial correspondents.

Montreal, Que., October 4, 1915.—The news from the front is having a cheerful effect upon the general market. The production of shells is still holding the attention of a large number of our manufacturers, and is progressing at a satisfactory rate. The feeling of uncertainty of producing a shell that will stand a rigid inspection has now passed, and the output of 3.3 and 4.5 shells in both shrapnel and high explosive form has reached the stage, that no future shortage in this connection need be looked for. The attention of many of our shell makers is now directed to the prospects of a heavier type of projectile being required, and in some cases preparations are already in progress for the manufacture of shells up to nine and twelve inches in diameter.

The prospect of field guns being built by Canadian concerns in the near future, has developed several inquiries relative to machine tool requirements; no definite action has as yet been taken in the matter.

Steel.

The steel mills are operating practically to capacity on war stock, and orders are still coming in for rounds, in many cases up to 6 inches diameter. This condition of affairs is likely to be maintained for many months to come.

Pig Iron.

Pig iron is little changed from previous weeks, quotations are generally holding firm, prices on "Victoria" showing an advance of 50c per hundred.

Metals.

Little change is noted in metal quotations, the only metal affected being aluminum, which shows an increase from 50 to 52 cents. The market in tin is dull, a few inquiries being made for October and November delivery. There is, however, little to stimulate buying, and large unsold stocks have a tendency towards a somewhat pessimistic feeling.

Lead remains quiet, expectations of an advance have not been realized. Prices are holding firm.

Spelter remains steady with inquiries for future delivery a little more pronounced.

Antimony is quiet but firm, while aluminum shows a little stronger tone.

Machine Tools and Supplies.

Machine tools are still in strong demand, and with the prospect of the manufacture of larger and heavier type shells in the near future, the enterprise

and capacity of the manufacturers is sure to be taxed to the utmost limit to procure reasonable delivery.

Machine shop supplies as may be expected are being used in larger quantities each succeeding week. Quotations on high speed steel are quite indefinite due to the fact that makers have withdrawn price lists, owing to the difficulty in securing the raw material.

Old Material.

The market in scrap metals is fairly brisk, crucible copper has advanced \$1.00 per hundred, wire shows a slight increase, while No. 1 wrought iron and heavy melting steel show an advance of \$1.00 per hundred. Heavy lead is up to \$4.50.

Toronto, Ont., Oct. 5.—An encouraging feature to be noted is the continued increase in our export trade, although this has not as yet done much to improve domestic business. The improvement in the steel trade, referred to later in these columns, is a good indication of the development that is taking place. While the principal development has been in the export trade, it will obviously be of the greatest benefit to the country generally, and will in due course help to stimulate internal trade. There has been for some time, and there still is, a decided tendency to economize in all directions, and consequently development will be restricted until conditions are on a more stable basis, which can hardly be expected until the war is over.

It is, however, satisfactory to note that the Dominion revenues for September promise to be even greater than anticipated. In the Customs revenue alone there is an increase of over two million dollars for the month of September over the corresponding month last year, and an increase of about \$1,750,000 for the first half of the present fiscal year. All indications point to a gradual improvement in domestic trade, due largely to war business of various kinds and, of course, to the excellent crops.

The output of shells is rapidly increasing. It is estimated that Canadian plants are producing one million shells per month, and that of this number 17,000 are being turned into fixed ammunition per day. It is announced that the Dominion Steel Corporation have practically completed arrangements for a large order for shell. The Canadian Car & Foundry Co. are making arrangements for sub-letting the last Russian

shell contract to American and Canadian firms.

Steel Market

That the steel trade in Canada is now in a prosperous condition is proved by the reports of the Dominion Steel Corporation and the Nova Scotia Steel Co. issued recently. As regards the first mentioned concern, the indebtedness to the bank is being rapidly wiped out by means of profits made principally in export business. It is stated that heavy orders have been received for bars, billets, wire and nails, and that contracts for T.N.T. have proved exceptionally profitable. The coal trade has also been the best in the history of the company.

With regard to the Nova Scotia Steel & Coal Co., the annual statement was considered most satisfactory. The output of shells for September this year was the largest for any month since the manufacture of munitions began, being over 40 per cent. greater than for August. It was reported that the orders on hand would keep the plant at the present high rate of production for at least six months, and that negotiations for further orders were in progress. The Eastern Car Co., a subsidiary of the Nova Scotia Steel Co., is doing well. The first consignment of 250 fifty-ton box cars for the Russian Government has been shipped and will go via the Panama Canal and Vladivostock. The complete order calls for two thousand cars, all of the fifty-ton capacity. The Algoma Steel Co. has booked an order for 17,000 tons of steel rails from the Pere Marquette Railway.

The steel plants continue working to capacity on bars and forgings for shells, there being practically no limit to the demand. The merchant bar business has improved to some extent, but the demand for structural shapes is still very light. Prices on steel products generally are very firm and may go higher. The high-speed tool steel situation is unchanged, and prices will no doubt advance further. The most serious aspect of the situation, however, is the difficulty of obtaining supplies in sufficient quantity, as an enormous amount of high-speed steel is now being used. Prices of galvanized sheets are firmer and have a higher tendency, owing to the recent strength of spelter.

The steel trade in the States is very active, and the demand for steel products of all kinds is increasing. The mills are full up with business, and the export demand for steel rounds for shell, barb wire and other steel products is enormously heavy. There is a great scarcity of Bessemer and open-hearth billets, and prices are very firm, forging billets having advanced to \$33 f.o.b. Pittsburgh. Steel hoops are now being quoted at 1.50c Pittsburgh. Prices on

bars, plates and scrap are very firm, with an upward tendency.

Pig Iron

The situation, generally speaking, is unchanged. There is a good demand for steel making pig iron, but quotations are quiet. It is reported that some pig iron is being exported to France. There are no price changes to note this week.

Scrap Metal

The scrap metal market is stronger, particularly for heavy melting steel, copper, brass and zinc scrap. Copper and brass scrap have advanced $\frac{1}{2}$ ¢ to 1¢ per pound; zinc $\frac{1}{2}$ ¢ per pound, and heavy melting steel \$1 per ton. Wrought iron scrap is now being quoted at \$9, and machinery cast iron at \$11 per ton. Heavy lead is easier at $4\frac{1}{2}$ ¢ per pound.

Machine Tools

The situation in the machine tool trade is practically the same as has prevailed for some weeks. Machine tool builders are working to capacity to fill orders on their books, but deliveries are still very backward. Comparatively few orders for new tools have been placed recently with local machinery houses, although a few of the larger firms making shells are buying single machines, in some cases second-hand tools. In the States there is a big demand for tools, and factory extensions are being held up owing to the difficulty in obtaining prompt delivery. In addition to the domestic demand, it is stated that English, French and Russian buyers are picking up all the machines they can find.

Supplies

The brisk demand for machine shop supplies continues, and prices are holding very firm. Prices of high-speed twist drills have practically been withdrawn, and are only being quoted subject to immediate acceptance. This is due, of course, to the scarcity and price of high-speed steel. Carbon drills have not as yet been affected, although there is a possibility of slightly higher prices being put in force.

Half-and-half solder has declined $\frac{1}{2}$ ¢ and is now quoted at 27 $\frac{1}{2}$ ¢ per pound. This is due to weakness in the tin market. Linseed oil has advanced 7¢ per gallon, and is now quoted at 72¢ for raw and 75¢ for boiled oil. Turpentine is unchanged at 64¢ per gallon, but there is a possibility of higher prices.

Metals

The successful termination of the Anglo-French loan negotiations in New York and the rise in sterling exchange to a more normal basis is expected to have a beneficial effect on the metal market. There has been, however, up to the present, no marked improvement, and with the exception of tin and copper

there have been no price changes of any particular importance. There has been increased activity in the copper market recently and prices are a little higher. Tin on the other hand has declined, due to weakness in the London market. The spelter situation is unchanged and the market steady. The lead market is firm

CANADIAN GOVERNMENT PURCHASING COMMISSION

The following gentlemen constitute the Commission appointed to make all purchases under the Dominion \$100,000,000 war appropriation:—George F. Galt, Winnipeg; Hormidas Laporte, Montreal; A. E. Kemp, Toronto. Thomas Hilliard is secretary, and the commission headquarters are at Ottawa.

and the price stationary. The antimony market is featureless, but there is a continued scarcity of aluminum, and quotations have a higher tendency. There is no change in the general situation locally and a brisk demand is reported for metals for munitions, ordinary business being only fair.

Tin.—The market is very dull and consumers are showing comparatively little interest in either spot tin or futures. At

ALLIES PURCHASING AGENTS

The Trade and Commerce Department, Ottawa, has published the following list of purchasing agents for military purposes for the allied Governments:

International Purchasing Commission, India House, Kingsway, London, Eng.

French.—Hudson Bay Co., 56 McGill Street, Montreal; Captain Lafoulloux, Hotel Brevort, New York; Direction de l'Intendence Ministère de la Guerre, Bordeaux, France; M. De la Chaume, 28 Broadway, Westminster, London.

Russian.—Messrs. S. Ruperti and Alexsieff, care Military Attache, Russian Embassy, Washington, D.C.

the spot market is the only one influencing the market. Tin has declined 1¢ locally and is being quoted at 38¢ per pound.

Copper.—The market is firm and higher, due to increased demand. It is believed that stocks are accumulating in the States notwithstanding the heavy consumption; production having reached a record mark. Copper has advanced

the spot market is the only one influencing the market. Tin has declined 1¢ locally and is being quoted at 38¢ per pound.

Spelter.—The market is quiet and featureless. Quotations are unchanged at 64¢ per pound.

Lead.—The market is quiet and featureless. Quotations are unchanged at 64¢ per pound.

Antimony.—The market is quiet and featureless. Quotations are unchanged at 55¢ per pound.

Aluminum.—Supplies of aluminum are very difficult to obtain for immediate delivery, except in small lots. Quotations are unchanged and nominal at 55¢ per pound.



BIG HYDRO PLANS GO TO GOVERNMENT

PLANS for a great development of the Hydro-Electric system of Ontario independent of all private developments and provide a supply sufficient not only for the next few years, but for many years to come, have been given final approval by the Hydro-Electric Commission and sent on to the Government.

As outlined by Sir Adam Beck at London several months ago upon the opening of the first Hydro radial in the province, the plans call for an initial development of 100,000 horse-power by utilizing the maximum head of power on the Niagara River, now undeveloped. The plants, it is understood, outline a possible supply from this source of 250,000 horse-power and cover as well developments possible from the utilization of the Welland Canal spillways, which will add as much more to the power supply of Ontario.

The construction of a great development plant in the Niagara district has become an urgent necessity by the rapid growth of the cheap power system in Ontario. Sir Adam Beck and his colleagues on the commission, Hon. I. B. Laidlaw, W. K. McLean, and M. G. Laidlaw, are facing the end of their present sources of supply. The 100,000 horse-power supply contracted for with private interests at Niagara Falls will soon be exhausted by the increasing demands of the municipalities, which even the big

here and there in the province will not meet. With the advent of Hydro radials on an important scale, the present supply will fall far short, and when that time arrives the commission must be in a position to furnish practically unlimited power.

The commission has received word that the Council of Gravenhurst has passed a by-law approving of a contract with the commission for the sale of the South Falls power plant, owned by the town. This plant is now producing but 500 horse-power, but the commission's engineers have estimated that the output can be immediately enlarged to 1,500, with a maximum horse-power without storage of 2,500 and storage of 4,000. The surplus power will be used to supply municipalities in the surrounding district, which have been pressing the commission for power. The Gravenhurst by-law will be submitted to the rate payers on October 2.



THE CHEMICAL ENGINEER

IN the modern organization there is room for the research chemist of high and wide attainments, for the scientifically trained engineer, also of wide attainments, and for a type of profes-

sionally trained man who is the natural medium of interchange between these two specialists. This intermediary is the chemical engineer. He must be a man of special aptitudes, inasmuch as he must have grasped the chemist's point of view as well of the engineer's. The chemist thinks and works in terms of atoms and molecules and the laws which govern their combination. The engineer thinks of matter in masses which can be moulded to his will by the craftsman, or of mechanical or electrical energy which can be generated, controlled, and measured by machinery. The chemist is the master and director of his own operations, which he can, for the most part, carry out with his own hands. The engineer loses his direct hold on his operations whenever his ideas have been fully committed to paper in the drawing office. It is his special function to organize the labors of many workers. A certain number of men are able to enter fully into the

spirit which actuates both types of expert, the chemist and the engineer; they can resist the particular exclusiveness of each, while giving to each its due weight. These are the naturally gifted chemical engineers who in one sense are "born, not made." In our colleges and universities the best that we can do for men of this gifted type is to give them the best possible opportunities for an all-round development of their powers. Dr. G. T. Bellby on "Chemical Engineering."



TO PREVENT accidents we must thoroughly understand their causes. Every danger point in every machine and in every process must be located and definitely grappled with. It is important to report accidents, but it takes less time to prevent them. Two minutes' work or care will often prevent an accident that would lose a man days from work.

CANADIAN COMMERCIAL INTELLIGENCE SERVICE

The Department of Trade and Commerce invites correspondence from Canadian exporters or importers upon all trade matters. Canadian Trade Commissioners and Commercial Agents should be kept supplied with catalogues, price lists discount rates, etc., and the names and addresses of trade representatives by Canadian exporters. Catalogues should state whether prices are at factory point, f.o.b. at port of shipment, or, which is preferable, c.i.f. at foreign port.

CANADIAN TRADE COMMISSIONERS.

Argentine Republic.

H. R. Poussette, 278 Balcarce, Buenos Aires. Cable Address, Canadian.

Australasia.

D. H. Ross, Stock Exchange Building, Melbourne, Cable address, Canadian.

British West Indies.

E. H. S. Flood, Bridgetown, Barbadoes, agent also for the Bermudas and British Guiana. Cable address, Canadian.

China.

J. W. Ross, 6 Klukiang Road, Shanghai. Cable Address Cancom.

Cuba.

Acting Trade Commissioner, Lonja del Comercio, Apartado 1290, Havana. Cable address, Cantracom.

France.

Phillipe Roy, Commissioner General, 17 and 19 Boulevard des Capucines, Paris. Cable address, Stadacona

Japan.

G. B. Johnson, P.O. Box 109, Yokohama. Cable Address, Canadian.

Holland.

J. T. Lithgow, Zuidblaak, 26, Rotterdam. Cable address, Watermill

Newfoundland.

W. B. Nicholson, Bank of Montreal Building, Water Street, St. John's. Cable address, Canadian.

New Zealand.

W. A. Beddoe, Union Buildings, Customs Street, Auckland. Cable address, Canadian.

South Africa.

W. J. Egan, Norwich Union Buildings, Cape Town. Cable address, Cantracom.

United Kingdom.

E. de B. Arnaud, Sun Building, Clare Street, Bristol. Cable address, Canadian.

J. E. Ray, Central House, Birmingham. Cable address, Canadian.

Acting Trade Commissioner, North British Building East Parade, Leeds. Cable address, Canadian.

F. A. C. Bickerdike, Canada Chambers, 36 Spring Gardens, Manchester. Cable address, Cantracom.

Fred. Dane, 87 Union Street, Glasgow, Scotland. Cable address, Cantracom.

Harrison Watson, 73 Basinghall Street, London, E.C., England. Cable address, Sleighing, London.

CANADIAN COMMERCIAL AGENTS.

British West Indies.

Edgar Tripp, Port of Spain, Trinidad. Cable address, Canadian.

R. H. Curry, Nassau, Bahamas.

Colombia.

A. E. Beckwith, c-o Tracey Hnos, Medellin, Colombia. Cables to Marmato, Colombia. Cable address, Canadian.

Norway and Denmark.

C. E. Sontum, Grubbege No. 4, Christiansa, Norway. Cable address, Sontums.

South Africa.

D. M. McKibbin, Parker, Wood & Co., Buildings, P.O. Box 559, Johannesburg.

E. J. Wilkinson, Durban, 41 St. Andrew's Buildings, Durban, Natal.

CANADIAN HIGH COMMISSIONER'S OFFICE.

United Kingdom.

W. L. Griffith, Secretary, 17 Victoria Street, London, S.W., England.

INDUSTRIAL AND CONSTRUCTION NEWS

Establishment or Enlargement of Factories, Mills, Power Plants, Etc.; Construction of Railways, Bridges, Etc.; Municipal Undertakings; Mining News

Engineering

Montreal, Que.—It is reported that Gustave Poirer is contemplating the construction of a plant for the manufacture of aeroplanes, etc.

Windsor, Ont.—The K. & W. Co. will supply the material for their factory at a cost of \$10,000. W. & G. Co., Windsor, are the general contractors.

Walkerville, Ont.—The Canadian Detroit Lubricator Co. will make an extension to their factory. Wells & Gray, Windsor, Ont., are the general contractors.

Collingwood, Ont.—The Imperial Steel & Wire Co. will start operations at their plant early in October. Some delay has been experienced in connection with the contracts.

Gravenhurst, Ont.—The Muskoka Lakes Corporation is contemplating installing a number of small steam pumps at various points for fire protection. W. E. Wasley, of the Muskoka Navigation Co., is manager.

Fort William, Ont.—The Fort William Coal Docks Co., contemplate making an extension to their plant on the Mission River, estimated to cost \$200,000. Included in the proposed addition will be a new hoist of a larger size than those now in use on the docks.

Toronto, Ont.—A scheme to provide a water supply for the southern portion of York Township was outlined in the report of Engineer Hugh Gall, submitted to the York Township Council at a special meeting held on September 30. The project as embodied in the report makes provision for all that district lying between the city limits and Eglinton Avenue, a distance of one and one-half miles. It is proposed to lay 12-in. and 6-in. cast iron pipe. The probable cost as estimated by the engineer is \$750,000.

New Liskeard, Ont.—Another large pulp and paper mill is to be built in Timiskaming. Sutcliffe & Neelands, engineers, of Liskeard, have been advised to hold themselves in readiness to proceed with work discontinued when war broke out. The location of the proposed mill is some 30 miles west of Cochrane. Three miles of railway are necessary to connect with the Transcontinental Road. It is estimated \$2,000,000 will be expended in the construction of this new

pulp mill, and American capital is being

Electrical

Chatsworth, Ont.—A contract will be made to install \$10,000 worth of electrical equipment.

London, Ont.—The City Council will purchase electrical equipment for the Hydro sub-station.

St. Marys, Ont.—Work is to commence on the new Hydro line from St. Marys to Exeter. The main power line will run from St. Marys to Exeter, passing through Windsor and London.

Municipal

Walkerville, Ont.—The railway by-law will be voted on by the ratepayers on October 16.

Dundas, Ont.—The town council passed a by-law to spend \$25,000 on the extension of the waterworks system.

East Angus, Que.—It is proposed to spend \$5,000 on extensions to the waterworks system.

Thetford Mines, Que.—A waterworks system will be installed at a cost of \$12,000.

Blenheim, Ont.—The town council contemplate installing an ornamental lighting system.

Brigden, Ont.—The bylaw to authorize the extension to the lighting plant has been defeated.

Goderich, Ont.—The town council are considering the installing of an electric light and power plant.

East Angus, Que.—The town will make extensions to its waterworks plant to cost \$5,000. R. C. Cowling is clerk.

St. Hyacinthe, Que.—A by-law has been carried providing for the installation of a complete gravity filter system, with a capacity of 4,000,000 gallons per day. Estimated cost, \$75,000.

Woodstock, Ont.—The ratepayers are asking the council to compel the Woodstock Gas Light Co. to supply purified gas. It is suggested that purifiers be installed by the company.

Sarnia, Ont.—A by-law will be voted by the city.

Montreal, Que.—The city has completed a modern street lighting system through the business portions of the city on St. Catherine and Filles, two of the main retail thoroughfares. The turning on of the current for this system will give Montreal its first street lighting of a modern nature.

Brockville, Ont.—The Water and Light Commission are soliciting new tenders for the filtration plant, according to the specifications and conditions prepared by the town engineer. One set of tenders have already been received but certain alterations have been made to the specifications and conditions.

Port Moody, B.C.—If the electors of Port Moody endorse a bylaw to be voted upon on Oct. 7, the city will become the home of an extensive steel works and rolling mills to be erected there by the Port Moody Steel Works Ltd. The bylaw is one to authorize the city council to make an agreement with the company guaranteeing its debentures to the amount of \$100,000.

Winnipeg, Man.—Seven tenders for electric mains, switchboards and circuit breakers for the power house at the new law courts, were opened by Hon. T. H. Johnson, minister of public works, on September 29. The tenders were as follows: The Schumacker, Gray Co., \$6,950; Star Electric, \$7,000; Electric Motor Sales & Repair Co., \$7,985; Goold Engineering and Supply Co., \$6,490; The Dominion Equipment and Supply Co., \$6,880; Robert McCrea, \$6,537.50; McDonald & Wilson Lighting Co., \$7,077.

General Industrial

Montreal, Que.—Pilkington Bros. have a new factory.

Chatham, Ont.—The William Rennie Co., Toronto, are building a warehouse and elevator, estimated to cost \$20,000.

Petrolia, Ont.—The Petrolia City Sugar Co. is contemplating establishing a plant, which will cost about \$800,000. E. Ivatt, Petrolia, is a stockholder.

St. John, N.B.—Daley & Carvell have purchased a site of 20 acres at Washademoak, N.B., and will build a factory for the manufacture of axes, etc.

Hamilton, Ont.—The Mercury Mills Co. will build a factory here, to cost approximately \$250,000. It is expected that construction work will begin shortly.

Medicine Hat, Alta.—W. E. Clarke proposes to establish a plant here for making clay products. A by-law will probably be voted on by the ratepayers on October 25, to ratify an agreement concluded by the City Council.

Ryerson, Sask.—The Saskatchewan Co-operative Elevator Co.'s elevator at this place was destroyed by fire on Sept. 21. The loss is estimated at \$8,500, which is fully covered by insurance. The elevator will be rebuilt.

Winnipeg, Man.—Alfred W. Lawson, of New York City, a prominent manufacturer of aeroplanes, etc., has been in communication with Industrial Commissioner Roland with regard to establishing a factory here for making aeroplanes.

Tenders

Ottawa, Ont.—Tenders for examining warehouse fittings, Fort William, Ont., will be received until Thursday, October 14, 1915. Plans and specifications may be seen on application to J. C. Stinson, clerk of works, Fort William, Ont.; Thos. A. Hastings, clerks of works, Postal Station "F," Toronto, Ont., and at the Department of Public Works, Ottawa.

Ottawa, Ont.—Tenders for public building fittings, Three Rivers, P.Q., will be received until Wednesday, October 13, 1915. Plans and specification may be seen on application to Chas. Lafond, architect, Three Rivers, P.Q.; to R. L. Deschamps, overseer, Montreal Central Post Office, and at the Department of Public Works, Ottawa.

Ottawa, Ont.—Under the direction of the Honorable the Minister of Militia and Defence, certain old stores, consisting of leather, 2,700 lbs.; leather, buff, 335 lbs.; wrought iron, 4,200 lbs.; scrap steel, 116 lbs., and other stores, comprising canvas, rope, rubber, tarpaulins, mattresses, etc., are for sale by public tender until October 15. These stores may be seen on application to the senior ordnance officer, Old Fort, Toronto, daily, between the hours of 2 p.m. and 6 p.m., Saturdays and Sundays excepted. Eugene Fiset, Deputy Minister, Department of Militia and Defence, Ottawa.

Toronto, Ont.—Tenders will be received, addressed to the chairman, Board of Control, up to Tuesday, October 12, 1915, for the construction and delivery of 36-inch stop valves, valve operating mechanism and special castings, for main pumping station. Specifications and forms of tender may be obtained at the Works Department, Room 12, City Hall.

Ottawa, Ont.—Tenders will be received up to Tuesday, October the 19th, for the undermentioned items for delivery to H.M.C. Dockyards at Halifax, N.S., and Esquimalt, B.C.: Brass bars, antimony, iron firebar, brass sheets, aluminum, pig iron, brass tubes, steel angles, iron angles, copper sheet, steel boltstaves, iron boltstaves, copper tubes, steel plates, iron sheets, zinc plates, steel sheets, India rubber, lead, milled steel for tools, sheet packing, or sheet, etc. Forms of tender and all information may be obtained by application to the undersigned, or to the Naval Store Officer at H.M.C. Dockyard, Halifax, N.S., or Esquimalt, B.C. Applicants for forms are requested to state definitely the item or items on which they desire to tender. G. J. Desbarats, Deputy Minister of the Naval Service.

Building Notes

St. John, N.B.—It is reported that large extensions will be made to the warehouses at the Sand Point docks here.

Toronto, Ont.—The erection of fire stations at Earls court and Wychwood, is contemplated. Plans have been prepared and sites purchased.

Toronto, Ont.—The city architect has issued a building permit to the Board of Education for the erection of a three-storey brick addition, costing \$51,500, to the North Toronto school on Eglinton avenue, near Brownlow avenue.

Toronto, Ont.—The Toronto Furniture Co. have applied to the City Architect's Department for permission to build a \$12,000 factory on Dufferin street near Liberty street. This will be used for the purpose of making boxes for the shipment of shrimped shells.

Toronto, Ont.—The Board of Control has granted to the Dominion Government a permit for the erection of a temporary post office at the south-east corner of Front and Bay Streets. It will be 100 by 200 feet, clad with steel, two storeys high, with flat roof.

Preston, Ont.—The Hydro-Electric Commission has just completed arrangements for the erection of six transformer station storehouses in Guelph, Preston, Berlin, St. Mary's, Woodstock,

and Cooksville. The buildings will be 36 by 60 feet, and will be of metal construction throughout.

Toronto, Ont.—The Board of Education proposes to build a large new school on Gledhill avenue, East Toronto, at a cost of \$55,400. An application has been made for a permit for this work. The Architect's Department has issued a permit to the Board for the erection of a three-storey brick school on Eglinton avenue, near Brownlow avenue. The structure will cost about \$51,500.

New Incorporations

The France & Canada Steamship Co. has been incorporated at Ottawa, with a capital of \$1,000,000, to operate a line of steamers between Canada and France. The head office will be in Montreal, Que.

The Standard Toys, Ltd. has been incorporated at Toronto, with a capital of \$40,000, to carry on the business of manufacturing toys, etc., at Toronto. Incorporators, John Anthony Chantler and Ernest Walter Chantler, of Toronto.

The Franco-Canadian Chemical Co. has been incorporated at Toronto, with a capital of \$1,000,000, to manufacture drugs and chemicals, at Toronto, Ont. Incorporators, Robt. Alexander Stephen and Adam McGowan Cook, of Toronto, Ont.

The Dominion Brake Shoe & Foundry Co. has been incorporated at Ottawa, with a capital of \$200,000, to manufacture all kinds of brake shoes at St. Thomas, Ont. Incorporators, James Stellar Lovell and William Bain, of Toronto, Ont.

The Dome Consolidated Mines, Ltd. has been incorporated at Toronto, with a capital of \$3,000,000 to acquire and develop mineral lands and deposits. The head office of the company will be at Toronto. Incorporators, Charles Henry Manaton and Arthur Hodgetts, of Toronto, Ont.

The Montreal Engine Packing Co. has been incorporated at Ottawa, with a capital of \$20,000, to take over the business carried on under the name of Montreal Engine Packing Co. at Montreal. Incorporators, Edgar Alexander Wright and Gordon Balfour Kingan, of Montreal.

The Canadian Duplex Steam Trap Co. has been incorporated at Ottawa, with a capital of \$40,000, to manufacture steam traps and other appliances, at Walkerville, Ont. Incorporators, Joseph Hector Mailhot and Thomas George Rakestraw, of Detroit, Mich., and Harry Owens Kerr, of Walkerville, Ont.

SOUTHWARK

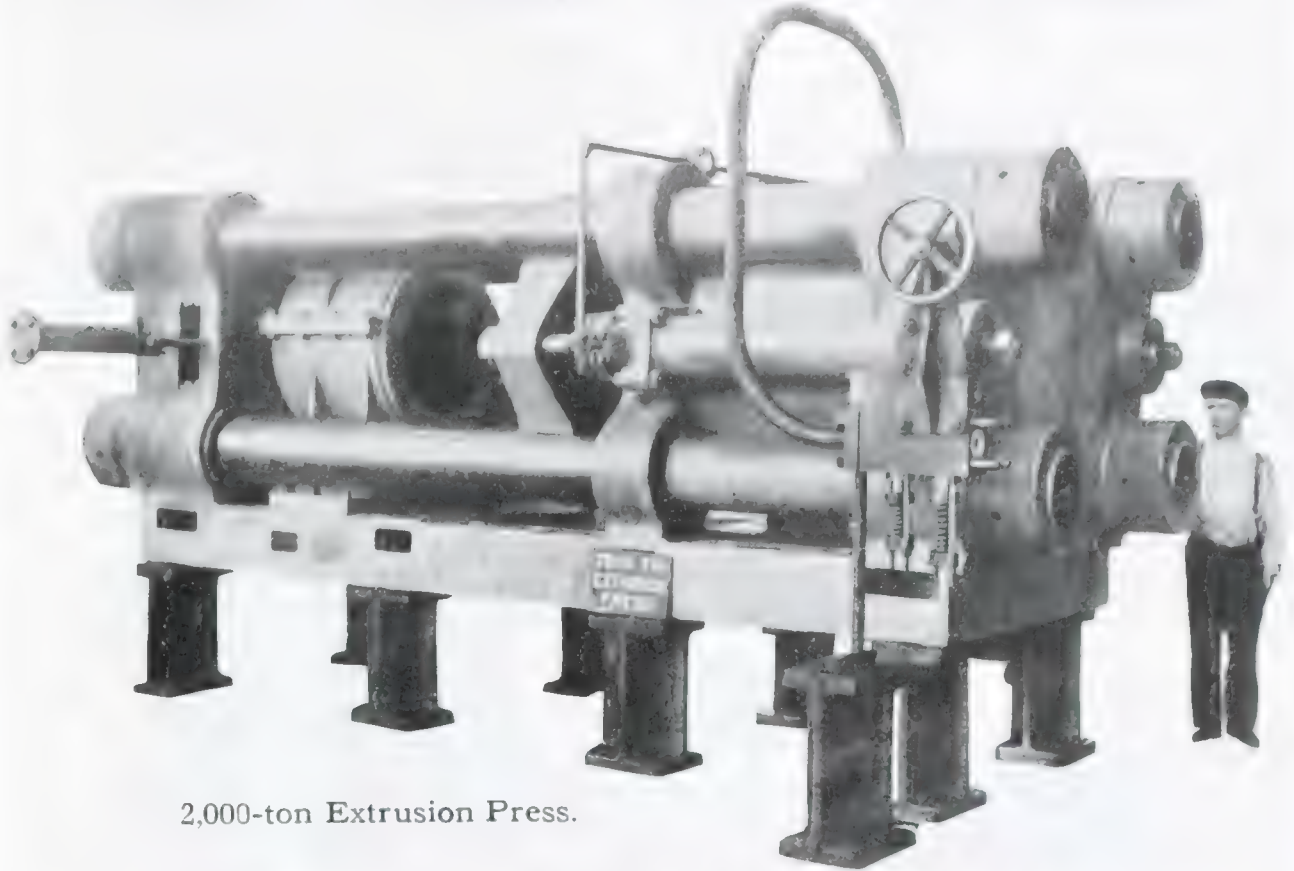
HYDRAULIC MACHINERY FOR ALL PURPOSES

Presses,
Cranes,
Leather Packings,

Pumps,
Hoists,
Pipe Fittings,

Riveters,
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Jacks,
Valves, etc., etc.



2,000-ton Extrusion Press.

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Southwark-Harris Valveless Oil
Engine. For Marine and
Stationary use — Built in sizes
up to 1500 B.H.P.

Southwark Foundry & Machine Company

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"First Builders of Large Centrifugal Pumps in America."

The Chevrolet Motor Co. of Canada, Ltd. has been incorporated at Ottawa, with a capital of \$500,000, to manufacture automobiles, etc., at Toronto. Incorporators, Harry Horsman, George Edmund Wooldridge, both of Toronto, Ont.

Wood-Working

Montreal, Que.—A fire on September 28 did about \$15,000 damage to the G. H. Randall Co. furniture factory.

Montreal, Que.—The sash and door factory of Benoit Sons, on St. Timothe Street, was destroyed by fire on Sept. 25.

Cache Bay, Ont.—Geo. Gordon & Co. are building a new mill, and will require woodworking machinery.

Cache Bay, Ont.—George Gordon & Co., Ltd., will rebuild its sawmill, recently destroyed by fire, at a cost of \$75,000. Alexander Trottier is in charge.

Vancouver.—The sawmill and buildings of the British Canadian Lumber Co., at New Westminster, have been sold for \$1,000,000 to Leonard Imboden.

Fredericton, N.B.—Donald Fraser & Sons, of this place, have purchased a property at Nelson, on the Miramichi, and will build a lumber mill at a cost of \$80,000.

Bancroft, Ont.—There is a probability of a new industry being established here to make broom handles, spools, etc. G. A. Turner and Wm. Paul, of Toronto, are interested.

Refrigeration

Hamilton, Ont.—A scheme providing for the establishment of a cold storage system in connection with the central market meat hall is being seriously considered by some of the aldermen.

Marine

Bathurst, N.B.—It is announced that arrangements are being made for the completion of the harbor development work here.

Ottawa, Ont.—The Government steamer *Montmagny*, which was rammed and sunk by the collier *Lingan* in the St. Lawrence over a year ago, is to be raised. The steamer now lies in ten fathoms of water off Grosse Isle. The contract for raising her has been awarded to the Levis Wrecking Company at \$27,000.

Canadian Coasting Laws.—The Lake Carriers' Association, of Cleveland, Ohio, has been officially notified that the Canadian coasting laws have been sus-

pending and American ships will be permitted to trade between Canadian lake ports during the remainder of the season. During the navigation season of 1914 there were 105 vessels of Canadian registry employed in the grain carrying trade on the Great Lakes, their total tonnage being 350,000. Owing to the transfer of many of these ships to the ocean trade, there are available this season only 56 Canadian ships, with combined tonnage of 109,000.

Personal

W. F. Hume, late manager of the Dominion Architectural Ironworks, Montreal, has been appointed shop superintendent of the Quebec Engineering Co., Quebec.

A. B. Smith, manager of the G. T. R. telegraphs, has resigned on account of ill-health. H. Hulatt has been appointed his successor, with headquarters in Montreal.

Captain Henry I. Matthews, who died last week at Lakeport, Ont., was the founder of the Lakeport Canning Factory, which was one of the constituent plants of the Canadian Cannery, Ltd. Until the latter organization was absorbed by the Dominion Cannery, Captain Matthews was one of its directors.

Trade Gossip

The Kelsey Wheel Co., Windsor, Ont., have increased their capital stock to \$250,000.

The Canadian Westinghouse Co., Hamilton, Ont., have been awarded a contract by the City of Ottawa, Ont., for switchboard and equipment, and also transformers, at a total cost of \$23,165.

The Monarch Engineering Co., has been licensed to carry on business in the Province of Ontario, with a capital not exceeding \$40,000. Alex. Fraser, of Niagara Falls, Ont., is the attorney.

Large Munition Contract.—The officials of the Dominion Steel Corporation were in Ottawa last week working on an unusually large munition contract. No definite announcement has yet been made, but it is understood that arrangements are practically completed for the work to go ahead.

Spanish River Pulp & Paper Mills.—The annual meeting of shareholders was held on October 1, at which the report for the year ending June 30, 1915, was approved. The following were elected to the board of directors: W. E. Stavert, P. B. Wilson, T. Watson Sims, C. E.

Read, B. J. Tooke, G. H. Mead and T. Gibson. The same board was elected by the Lake Superior Paper Co.

Canada Steamship Lines.—Five vessels of the Canada Steamships Lines fleet, now engaged in lake trade, are being reconstructed, and will be placed at the disposal of Canadian grain exporters for ocean service. This is the first step taken by the commission at Ottawa, of which Hon. Robert Rogers is president, to relieve the scarcity of tonnage, which is hampering Canadian export trade.

Dominion Steel Foundry Co.—An addition, 100 x 160 feet, to the main foundry building of the Dominion Steel Foundry Co., Hamilton, Ont., is nearing completion. The company has installed in this addition one 25-ton acid open-hearth furnace and one 30-ton Shaw electric 4-motor crane. The company has also installed a complete outfit for machining 3-inch British shrapnel shells and machinery for finishing 4.5 howitzer shells.

The Eastern Car Co., New Glasgow, N.S., subsidiary of Nova Scotia Steel & Coal, has shipped the first consignment of the two-thousand-car order placed by the Russian government. The shipment, consisting of 250 complete cars, was made in one of the vessels controlled by the parent company, and will travel to its destination via the Panama Canal. It is estimated that orders from the Russian and French governments will require fifteen steamers to transport. The company has increased its output during the past few weeks from 20 to 40 complete cars.

Ambulances Gift.—Noel Marshall accepted a motor ambulance on behalf of the Red Cross Society on September 30 from the employees of the McLaughlin Carriage Co., at the warerooms of the company in Toronto. Mrs. Ward, president of the Toronto District W.C.T.U., also presented a motor ambulance to the Red Cross Society through Mr. Marshall later in the afternoon at Willard Hall, Gerrard Street. Both these machines were the product of the McLaughlin Carriage Co., and will be sent to the front.

Inquiry for Grain Elevator Equipment.—A number of elevators for storage of grain are likely to be constructed in the near future by a foreign government these varying in capacity from 250,000 to 1,250,000 bushels. Such work has been supplied in the past from Germany but as further supplies are not obtainable from that country the government in question desires to be informed from Canadian sources the cost of elevators both in construction and in re-

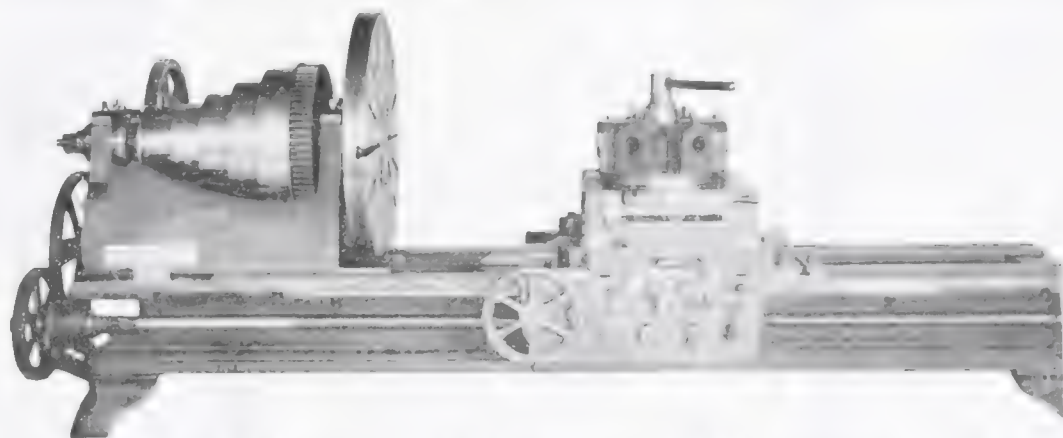
**Shrapnel and High Explosive Steel
Turnings or Cuttings.**

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Crop Ends and Defective Shells.**

*Will pay highest market cash
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42-inch New Haven Turret Lathe

Boring Machines
Gear Cutters
Grinders
Milling Machines
Planers
Shapers
Turret Lathes
Vertical Lathes
Welding
Presses
Saws
Drills
Pumps
Compressors
Engines
Motors
Generators
Transformers
Switches
Circuit Breakers
Relays
Control Systems
Testing Equipment
Measuring Instruments
Dial Indicators
Vernier Calipers
Micrometers
Gauges
Templates
Patterns
Molds
Core Boxes
Sand Castings
Investment Castings
Forgings
Weldments
Structural Steel
Pipe
Fittings
Flanges
Valves
Pumps
Compressors
Engines
Motors
Generators
Transformers
Switches
Circuit Breakers
Relays
Control Systems
Testing Equipment
Measuring Instruments
Dial Indicators
Vernier Calipers
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Investment Castings
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Structural Steel
Pipe
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Flanges
Valves

Lathes
Turret Lathes
Vertical Lathes
Planers
Shapers
Milling Machines
Grinders
Gear Cutters
Boring Machines
Presses
Saws
Drills
Pumps
Compressors
Engines
Motors
Generators
Transformers
Switches
Circuit Breakers
Relays
Control Systems
Testing Equipment
Measuring Instruments
Dial Indicators
Vernier Calipers
Micrometers
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11" x 4 1/2' Putnam
14" x 6' LeBlond
16" x 8' Flatler
18" x 8' Bradford
18" x 6' Blaisdell
18" x 10' Schumacher & Boye
20" x 10' Field
20" x 10' Bogert
24" x 10' Fish, gap
24" x 8' Putnam
34" x 13' Ford

PLANERS AND SHAPERS

36" x 36" x 8' Fitchburg
36" x 35" x 15' Powell
14" Gould & Eberhardt, crank
15" Hendey, tool room
16" Stockbridge, crank, P.D.F.
20" Smith & Mills, o.g., crank
24" Ayerbeck, b.g., crank
26" Walcott, shifting belt

DRILL PRESSES

20" Miscellaneous makes (20)
24" Cincinnati (2)
26" Stoley & Ware
28" Barnes
28" Stoley & Ware
31" Barnes
Barnes No. 1, horizontal
Avey 2-spindle ball-bearing
Prentice 5' Plain Radial

MILLING MACHINES

No. 2 Fox, hand
No. 3 Fox, hand and power
No. 1 Brown & Sharpe
No. 4 Newton
No. 1 Brown & Sharpe, universal
No. 7 Becker, Lincoln
No. 1 Warner & Swasey Die Sinker
No. 2 Warner & Swasey Die Sinker
No. 2 Pratt & Whitney Die Sinker

PRESSES

Bliss No. 18 o.b.i.
Bliss No. 19 o.b.i.
Bliss No. 42 o.b.i.
Rockford No. 2 o.b.i.
American Can No. 1 o.b.i.
Walsh No. 4 o.b.i.
American Can No. 1 1/2 o.b.i.
Barroth No. 5 o.b.i.
Bliss No. 69-X Double Acting
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Toledo No. 14 Horning
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Aeme 1 1/2" Bolt Cutter
Aeme 2 1/2" Bolt Cutter
No. 2 and No. 3 M & M Keys at r
No. 3 Baker Key at r with rotary
table
P & S, No. 1 Saw Machine

gard to machinery and equipment. Information can be obtained by reference to the Department of Trade and Commerce, Ottawa (File A-1575).

The Turbine Equipment Co., Toronto, have recently secured the following contracts:—Canadian Copper Co., Copper Cliff, Ont., two 7 1/2 million-gallon a day De Laval centrifugal pumps, direct connected to Canadian Westinghouse motors; Pilkington Bros., Thorold, Ont., one De Laval 3-stage pump, direct connected to Canadian Crocker Wheeler motor; Samuel Austin & Co., Thorold, Ont., one De Laval single-stage pump, direct connected to Canadian Crocker Wheeler motor; Kerr Lake Mining Co., Cobalt, Ont., one De Laval 3-stage pump, direct connected to Canadian Westinghouse Co. motor.

Soo Canal Traffic—Eastbound traffic through the St. Mary's Falls Canals, Sault Ste. Marie, Ont., shows a large increase over September of last year, according to the monthly statistical report compiled by the engineer's office. Last year, 6,368,408 tons were locked through eastbound, while during September, 1915, 907,771 tons passed the Soo. The increase is shown in the entire list of commodities except flour, iron ore leading, of which 7,796,965 tons were carried through, or 2,509,808 tons more than September, 1914. Copper also shows a heavy increase, being 9,160 tons over last year. The amount of grain and wheat locked for lower lakes elevators was 31,927,870 bushels, against 27,579,621 for September, 1914, or an increase of 4,668,249. The passenger list eastbound during September this year was nil. Westbound traffic shows a decrease. The total freight, however, showed a net increase of 2,561,735 tons. 445 more passages being registered for the month over last year.

Catalogues

Trucks.—The "Lifton" truck for handling goods piled on platforms is described in a bulletin issued by the W. S. Mahaffy Co., Toronto. The truck is illustrated, and the essential particulars are given.

Reducing Valves, made by the James Morrison Brass Mfg. Co., Toronto. The J.M.T. standard reducing valve is fully described in this bulletin, which also includes directions for installing, cleaning and method of operation. The bulletin is illustrated.

"**Foundry Filosofy**" is the title of a booklet published by the Hill & Griffith Co., Cincinnati, Ohio, manufacturers of foundry facings, supplies and equipment. The booklet is a combination of

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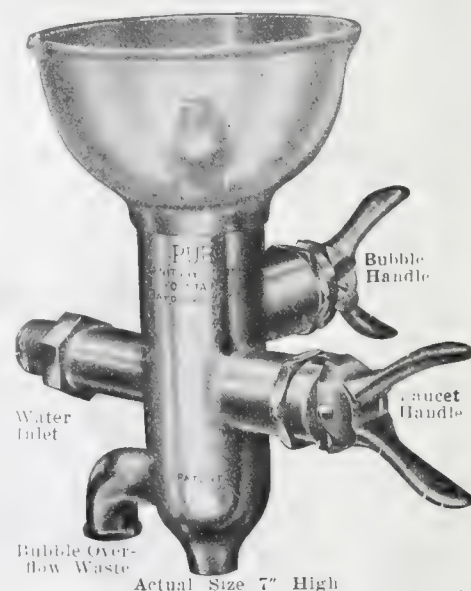
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• **Discussion:** – the conclusions and a brief description of the company's portfolio. Products and services company are included around the latter.

Steam Traps—This convenient 1-page Maytag Co. Bulletin will save almost a fortune describing the John Maytag steam trap. The pertinent features of this trap are dealt with as briefly and the construction shown. The very attractive outline is a true good description of the advantages of this trap, and a list of users is also included.

Edison Mazda "C" Lamp. The second and final volume of the General Bulletin No. 43603A, issued by the Canadian General Electric Co., Limited. A full description is given of the Edison Mazda lamp and the wide field of application is dealt with. In the latter connection are a number of case studies, a variety of installations in addition to descriptions of lamps, fixtures, and fixtures. Tables are included giving data on these lamps.

Steam Specialties and Mill Supplies.—Lath, Smith & Co., Montreal, Que., have issued a new catalogue of their goods with an interesting line of flexible metallic hose, steam traps, packings, miscellaneous steam goods, tools, mill supplies, etc. The various products are illustrated and described, while complete price lists are included. This is a well gotten up catalogue, containing 62 pages, with index, and will be found useful for engineers and others desiring to have on hand for reference.

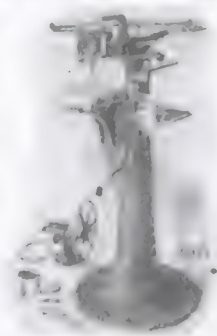
TORONTO HYDRO-ELECTRIC
REPORT

NET earnings of \$303,686 for the first half of this year were recently reported by the Toronto Hydro-Electric system. The money was spent as follows: Interest, \$130,948; interest on past instalments, \$199,414; interest on past instalments, accrued, \$46,635; balance for depreciation and annual adjustments, \$121,100.

The income of the concern for the first six months totalled \$770,553, made up as follows: Commercial light, \$217,670.88; commercial light, \$174,662.51; municipal building light, \$9,878; municipal power earnings, \$80,287.84; municipal street lighting earnings, \$170,916.20; rent of meters, \$805.24; stores charges, \$21,122.57; system consumption, \$3,279.02; miscellaneous general expenses, contract account, \$2,815.17; other municipalities, \$1,700.39; non-operating income, \$9,378.53. The cost of electric current was \$184,835.63, and the expenses of operation, etc., \$228,031.60.

The assets of the system are placed at \$7,596,947.78, and the liabilities amount to \$121,109 less.

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MONTREAL

General Manager Couzens declares that in spite of the war business has increased, that the unit cost of operation has decreased over 10 per cent., that the Hydro in the period mentioned benefited to the extent of \$94,000, that the amount of power purchased from the Provincial Commission was \$185,000, as compared with \$147,000 in the same period last year, and that the system has not yet received from the city the proceeds of the debentures sold some months ago, and the amount due in respect of the loss on the bonds last year, amounting altogether to \$1,350,000. The city, however, has a contra account for about a million dollars for interest and sinking fund.



AUSTRALIAN TRADE AND THE WAR

A COMPARISON of the manner in which Australian and Canadian trade have been affected by the war, and an official statement as to the number of soldiers Britain's Antipodean colony has contributed to the allied cause is contained in a report to the Canadian Government by Trade Commissioner Ross in Melbourne.

Australian trade during 1913-14 totalled \$812,812,658, as compared with a Canadian total of \$1,113,562,107. In 1914 her trade was but \$608,652,014, as compared with Canada's showing of \$1,078,173,240.

Since the declaration of war on August 4, 1914, the Commonwealth had organized, equipped and despatched 76,566 troops for active service abroad. At the present time 40,400 troops are in camps in Australia for despatch to the front. The Government has announced its determination to continue to train, equip and transport to the seat of war every available man presenting himself for service and who succeeds in passing the necessary medical examination.

To date, the grand total of the Australian expeditionary forces raised has reached 117,000 men, excluding 8,000 troops of the citizen forces mobilized for home defence. Reinforcements are going forward at the rate of 5,300 a month, and this number will be increased. The various divisions comprise infantry, to 10,600 in October and in November. light horse, ammunition columns, artillery, engineers, army service corps, army medical corps, flying corps, veterinary sections, bridging train and pay corps.

At the request of the Government of India a section of the Australian flying corps was despatched to the Persian Gulf, and is working in conjunction with the Royal Flying Corps. Further reinforcements are to be sent.

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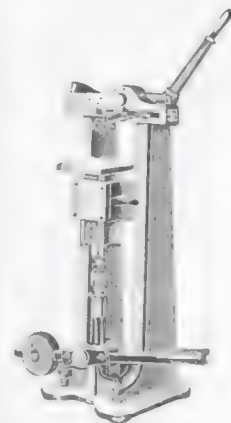
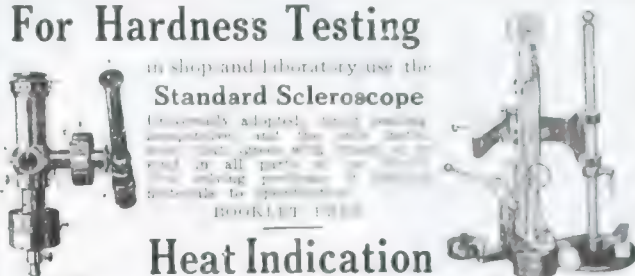
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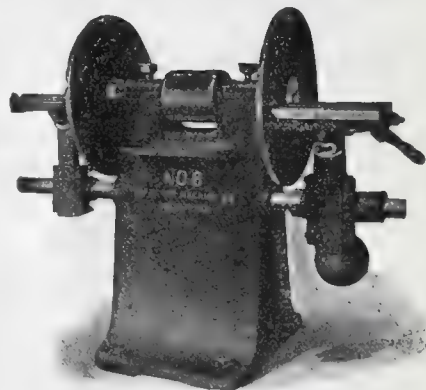
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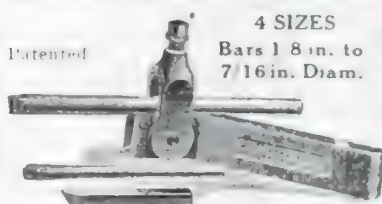


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Tabor Mfg. Co., Philadelphia, Pa.

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Graton & Knight Mfg. Co., Montreal.

Belt Lacing, Leather.

Graton & Knight Mfg. Co., Montreal.

Belt Lacing, Chain.

Can. Fairbanks-Morse Co., Montreal.

Graton & Knight Mfg. Co., Montreal.

James & Glawco, Montreal.

Morse Chain Co., Ithaca, N.Y.

Belt Lacing, Cotton.

Dominion Belting Co., Hamilton.

Belt Lacing, Leather.

Can. Fairbanks-Morse Co., Montreal.

Grand Machine & Tool Co., Philadelphia, Pa.

Graton & Knight Mfg. Co., Montreal.

Mott & Merryweather Machy. Co., Cleveland, O.

Belt Lacing, Cotton Duck.

Dominion Belting Co., Hamilton, Ont.

Main Belting Co., Montreal.

Belt Lacing, Rubber.

Can. H. W. Johns-Manville Co., Limited, Toronto.

Benders, Angle and Tee Iron.

Can. Buffalo Forge Co., Montreal.

Watson-Stillman Co., Aldene, N.J.

Bending Machinery.

John Bertram & Sons Co., Dundas.

Bertrams, Limited, Edinburgh, Scotland.

Bliss, E. W. Co., Brooklyn, N.Y.

Brown Riggs Co., Ltd., Hamilton, Canada.

Can. Buffalo Forge Co., Montreal.

Can. Machine & Tool Co., Galt, Ont.

Charles F. Elmes Eng. Works, Chicago.

Jardine, A. B., & Co., Hespeler, Ont.

National Machinery Co., Tiffin, Ohio.

National Machinery & Supply Co., Hamilton.

Niles-Bement-Pond Co., New York.

Owen Sound Iron Works Co., Owen Sound.

Toledo Machine & Tool Co., Toledo, O.

Steel Bending Brake Works, Chatham, Ont.

Watson-Stillman Co., Aldene, N.J.

Blas, Steel.

Dennis Wire & Iron Works Co., Ltd., London, Canada.

Thomas Iron Works, Ltd., Toronto.

Bit Brace Tools.

Wells Bros. Co., Greenfield, Mass.

Wilt Twist Drill Co. of Canada, Ltd., Walkerville, Ont.

Blas Gauges, Cupola.

Can. Buffalo Forge Co., Montreal.

Sheldons, Ltd., Galt, Ont.

Whiting Foundry Equipment Co., Harvey, Ill.

Blocks, Lifting.

Northern Crane Works, Walkerville.

Blowers.

Can. Buffalo Forge Co., Montreal.

Can. Sirocco Co., Ltd., Windsor, Ont.

Chicago Flexible Shaft Co., Chicago, Ill.

Grand Machine & Tool Co., Philadelphia, Pa.

Sheldons, Ltd., Galt, Ont.

Southeyk Foundry & Machine Co., Philadelphia.

Blow Pipes and Regulators.

L'Air Liquide Society, Montreal, Toronto.

Lever Bros., Toronto.

Bluing Ovens.

Oven Equipment & Mfg. Co., New Haven, Conn.

Boilers.

Can. Locomotive Co., Kingston, Ont.

National Machinery & Supply Co., Hamilton.

Owen Sound Iron Works Co., Owen Sound.

Pleasville Foundry, Pleasville, Que.

Boiler Compounds.

Can. H. W. Johns-Manville Co., Limited, Toronto.

Boiler Graphite.

Dixon Crucible Co., Jersey City, N.J.

Boiler Makers' Supplies.

Jno. F. Allen Co., New York.

Bolt Cutters and Nut Tapers.

Wells Brothers Co., Greenfield, Mass.

Bolts.

Galt Machine Screw Co., Galt, Ont.

London Bolt & Hinge Works, London, Ont.

Bolt and Nut Machinery.

A. R. Williams Machy. Co., Toronto.

John Bertram & Sons Co., Dundas, Ont.

Owen Sound Iron Works Co., Owen Sound.

Gardner, Robt., & Son, Montreal.

Landis Machine Co., Waynesboro, Pa.

National Machinery Co., Tiffin, O.

National Machinery & Supply Co., Hamilton.

Wiley & Russell Co., Greenfield, Mass.

Books.

MacLean Publishing Co., Toronto.

Boring Machines, Upright and

Horizontal.

John Bertram & Sons Co., Dundas.

Colburn Machine Tool Co., Franklin, Pa.

Grand Machine & Tool Co., Philadelphia, Pa.

Hill, Glasse & Co. of Chicago, Chicago, Ill.

Mott & Merryweather Machy. Co., Cleveland, O.

National Machinery & Supply Co., Hamilton.

Niles-Bement-Pond Co., New York.

Stow Mfg. Co., Binghamton, N.Y.

Boring Machines, Pneumatic.

Cylinder.

Baker Brothers, Toledo, O.

Cleveland Pneumatic Tool Co. of Canada, Toronto.

Can. Fairbanks-Morse Co., Montreal.

Can. Ingersoll-Rand Co., Montreal.

Independent Pneumatic Tool Co., Chicago, Ill.

Stow Mfg. Co., Binghamton, N.Y.

Boring and Turning Mills.

John Bertram & Sons Co., Dundas.

Grand Machine & Tool Co., Philadelphia, Pa.

National Machinery & Supply Co., Hamilton.

Niles-Bement-Pond Co., New York.

Boxes, Annealing, Charging.

Media Machine Co., Toronto, Pa.

Box Puller.

Jardine, A. B., & Co., Hespeler, Ont.

Boxes, Steel Shop.

Cleveland Wire Spring Co., Cleveland.

Boxes, Tote.

Cleveland Wire Spring Co., Cleveland.

Brakes.

Brown, Boggs & Co., Hamilton, Can.

Whiting Foundry Equipment Co., Harvey, Ill.

Brakes, Heavy Plate Bending and Corbice.

Steel Bending Brake Works, Ltd., Chatham, Ont.

Brass Working Machinery.

A. R. Williams Machy. Co., Toronto.

Gardner, Robt., & Son, Montreal.

Grand Machine & Tool Co., Philadelphia, Pa.

National Machinery & Supply Co., Hamilton.

Wagner & Seasey Co., Cleveland.

Niles-Bement-Pond Co., New York.

Brick Cars.

Can. Buffalo Forge Co., Montreal.

Sheldons, Ltd., Galt, Ont.

Brick Dryers.

Can. Buffalo Forge Co., Montreal.

Can. Sirocco Co., Ltd., Windsor, Ont.

Sheldons, Ltd., Galt, Ont.

Brick Machinery.

Eastern Machinery Co., New Haven, Conn.

Sheldons, Ltd., Galt, Ont.

Bridges, Railway and Highway.

Can. Bridge Co., Walkerville, Ont.

Buckets, Clam Shell, Crab and

Dump.

Whiting Foundry Equipment Co., Harvey, Ill.

Buffing and Polishing Machinery.

Canadian Hart Wheels, Ltd., Hamilton, Ont.

Fort-Smith Machine Co., Hamilton, Ont.

Grand Machine & Tool Co., Philadelphia, Pa.

Gray Mfg. & Machine Co., Toronto.

New Britain Machine Co., New Britain, Conn.

Buildings.

John Bertram & Sons Co., Dundas.

E. W. Bliss Co., Brooklyn, N.Y.

Canada Mach. Corporation, Galt, Ont.

National Machinery & Supply Co., Hamilton, Ont.

Watson-Stillman Co., Aldene, N.J.

Burners, Enclosed Flame Gas.

Oven Equipment & Mfg. Co., New Haven, Conn.

Burners, Fuel, Oil and Natural Gas.

Whiting Foundry Equipment Co., Harvey,

Castings, Aluminum.

Cunningham & Son, St. Catharines, Ont.
Owen Sound Iron Works Co., Ltd., Owen Sound, Ont.
St. Lawrence Foundry, Galt, Ont.
Tallman Brass & Metal Co., Hamilton

Castings, Air Furnaces.

Wm. Tod Company, Youngstown, O.

Castings, Brass.

Cunningham & Son, St. Catharines, Ont.
Alexander Fleck, Ltd., Ottawa.
T. C. Lawrence Foundry, Galt, Ont.
Mesta Machine Co., Pittsburg, Pa.
Owen Sound Iron Works Co., Owen Sound.
Plessisville Foundry, Plessisville, Que.
Tallman Brass & Metal Co., Hamilton
Wm. Tod Company, Youngstown, O.

Castings, Bronze.

Cunningham & Son, St. Catharines, Ont.
Mesta Machine Co., Pittsburg, Pa.
Tallman Brass & Metal Co., Hamilton
Wm. Tod Company, Youngstown, O.

Castings, Copper.

Cunningham & Son, St. Catharines, Ont.
Tallman Brass & Metal Co., Hamilton, Ont.

Castings, Gray Iron.

Brown, Boggs Co., Ltd., Hamilton, Canada.
Erie Foundry Co., Erie, Pa.
Alexander Fleck, Ltd., Ottawa.
Gardner, Robt., & Son, Montreal.
Hull Iron & Steel Foundries, Ltd., Hull, Quebec.
Mesta Machine Co., Pittsburg, Pa.
Owen Sound Iron Works Co., Owen Sound.
Plessisville Foundry, Plessisville, Que.
Wm. Tod Company, Youngstown, O.

Castings, Steel Chrome and Manganese Steel.

Hull Iron & Steel Foundries, Ltd., Hull, Quebec.
Mesta Machine Co., Pittsburg, Pa.
Wm. Tod Company, Youngstown, O.

Castings, Malleable.

Galt Malleable Iron Co., Galt.

Castings, Nickel Steel.

Hull Iron & Steel Foundries, Ltd., Hull, Quebec.
Mesta Machine Co., Pittsburg, Pa.

Cement, Disc Wheel.

Gardner Machine Co., Beloit, Wis.

Cement, Iron.

Can. H. W. Johns-Manville Co., Limited, Toronto.
Shelton Metallic Filler Co., Derby, O.

Cement Machinery.

Can. Fairbanks-Morse Co., Montreal.
Gardner, Robt., & Son, Montreal.
National Machinery & Supply Co., Hamilton, Ont.
Owen Sound Iron Works Co., Owen Sound.

Centre Reamers.

Wells Brothers Co., Greenfield, Mass.

Centering Machines.

John Bertram & Sons Co., Dundas.
Gardner, Robt., & Son, Montreal.
Girard Machine & Tool Co., Philadelphia, Pa.
Hurlbut, Rogers Machinery Co., South Sudbury, Mass.
National Machinery & Supply Co., Hamilton.
Niles-Bement-Pond Co., New York.
Pratt & Whitney Co., Dundas, Ont.

Centrifugal Pumps.

Can. Buffalo Forge Co., Montreal.
Pratt & Whitney Co., Dundas, Ont.
Southwork Foundry & Machine Co., Philadelphia, Pa.
Smart-Turner Machine Co., Hamilton, Ont.

Chain Blocks.

Can. Fairbanks-Morse Co., Montreal.
National Machinery & Supply Co., Hamilton.

Chains, Silent and Transmission.

Jones & Glasco, Montreal.
Morse Chain Co., Ithaca, N.Y.
Plessisville Foundry, Plessisville, Que.

Chemists.

Toronto Testing Laboratory, Ltd., Toronto.

Chucks, Aero, Automatic.

Garrin Machine Co., New York.

Chucks, Drill, Lathe and Universal.

John Bertram & Sons Co., Dundas, Ont.
Buffalo Forge Co., Buffalo, N.Y.
Can. Fairbanks-Morse Co., Montreal.

Cleveland Twist Drill Co., Cleveland.
Cushman Chuck Co., Hartford, Conn.
Gardner, Robt., & Son, Montreal.
Girard Machine & Tool Co., Philadelphia, Pa.
Wells Brothers Co., Greenfield, Mass.
Jacobs Mfg. Co., Hartford, Conn.
Ker & Goodwin, Brantford.
Modern Tool Co., Erie, Pa.
Morse Twist Drill & Machine Co., New Bedford.
National Machinery & Supply Co., Hamilton.
Skinner Chuck Co., New Britain, Conn.
D. E. Whiton Machine Co., New London, Conn.
Wilt Twist Drill Co. of Canada, Ltd., Walkerville, Ont.

Chucks, Drill, Automatic and Keyways.

Buffalo Forge Co., Buffalo, N.Y.

Chucks, Ring Wheel.

Gardner Machine Co., Beloit, Wis.

Chucking Machines.

Garrin Machine Co., New York.
Girard Machine & Tool Co., Philadelphia, Pa.
New Britain Machine Co., New Britain, Conn.
Niles-Bement-Pond Co., New York.
Turner Machine Co., Danbury, Conn.
Warner & Swasey Co., Cleveland, O.

Clocks, Time and Watchman's.

Lintz-Porter Co., Toronto.

Cloth and Wool Dryers.

Canada Wire & Iron Goods Co., Hamilton, Ont.
Sheldons, Limited, Galt.

Clutches.

Eastern Machinery Co., New Haven, Conn.
Jones & Glasco, Montreal.
Owen Sound Iron Works Co., Owen Sound.
Positive Clutch & Pulley Works, Ltd., Toronto.

Coal Handling Machinery.

Whiting Foundry Equipment Co., Harvey, Ill.

Coke and Coal.

Hanna & Co., M. A., Cleveland, O.

Collectors, Pneumatic.

Can. Buffalo Forge Co., Montreal.
Sheldons, Limited, Galt.

Compressors, Air.

Cleveland Pneumatic Tool Co. of Canada, Toronto.
Independent Pneumatic Tool Co., Chicago.
Mesta Machine Co., Pittsburg, Pa.
National Machinery & Supply Co., Hamilton.
Southwork Foundry & Machine Co., Philadelphia, Pa.
The Smart-Turner Machine Co., Hamilton.

Concentrating Plant.

Gardner, Robt., & Son, Montreal.

Concrete Mixers.

A. R. Williams Machy. Co., Toronto.
Can. Fairbanks-Morse Co., Montreal.
National Machinery & Supply Co., Hamilton.

Concrete Reinforcement.

Canada Wire Goods Mfg. Co., Hamilton.

Condensers.

Can. Buffalo Forge Co., Montreal.
Mesta Machine Co., Pittsburg, Pa.
The Smart-Turner Machine Co., Hamilton.
Southwork Foundry & Machine Co., Philadelphia, Pa.
Wm. Tod Company, Youngstown, O.

Contracting Engineers, Electrical

Lintz-Porter Co., Toronto.

Controllers and Starters,

Electric Motor.

A. R. Williams Machy. Co., Toronto.
Toronto & Hamilton Electric Co., Hamilton, Ont.

Conveyor Machinery.

Can. Fairbanks-Morse Co., Montreal.
National Machinery & Supply Co., Hamilton, Ont.
Plessisville Foundry, Plessisville, Que.
The Smart-Turner Machine Co., Hamilton.

Coping Machines.

Can. Buffalo Forge Co., Montreal.
John Bertram & Sons Co., Dundas.
National Machinery & Supply Co., Hamilton, Ont.
Niles-Bement-Pond Co., New York.

Cornice Brakes.

Brown Boggs Co., Ltd., Hamilton, Canada.
Steel Bending Brake Wks., Chatham.

Counting Machines.

National Scale Co., Chicopee Falls, Mass.
C. J. Root Co., Bristol, Conn.

Counterbores and Countersinks.

Cleveland Twist Drill Co., Cleveland.
Morse Twist Drill & Machine Co., New Bedford.
Pratt & Whitney Co., Dundas, Ont.
Wells Bros. Co., Greenfield, Mass.
Wilt Twist Drill Co. of Canada, Ltd., Walkerville, Ont.

Countershafts.

Baird Machine Co., Bridgeport, Conn.
Wells Bros. Co., Greenfield, Mass.

Country House Lighting and Cooking.

Can. Blaugas Co., Montreal.

Couplings.

Can. H. W. Johns-Manville Co., Ltd., Toronto.
Eastern Machinery Co., New Haven, Conn.
Gardner, Robt., & Son, Montreal.
Owen Sound Iron Works Co., Owen Sound, Ont.

Couplings, Air Hose.

Cleveland Pneumatic Tool Co. of Canada, Toronto.

Crabs, Travelling.

Owen Sound Iron Works Co., Owen Sound.

Cranes, Locomotive.

Northern Crane Works, Walkerville.

Cranes, Gantry.

Northern Crane Works, Walkerville.
Smart-Turner Machine Co., Hamilton, Ont.
Whiting Foundry Equipment Co., Harvey, Ill.

Cranes, Goliath.

Herbert Morris Crane & Hoist Co., Ltd., Toronto.
Northern Crane Works, Walkerville.
Whiting Foundry Equipment Co., Harvey, Ill.

Cranes, Hydraulic.

Watson-Stillman Co., Aldene, N.J.

Cranes, Pneumatic.

Northern Crane Works, Walkerville.
Whiting Foundry Equipment Co., Harvey, Ill.

Cranes, Post Jib.

Northern Crane Works, Walkerville.
Smart-Turner Machine Co., Hamilton, Ont.
Whiting Foundry Equipment Co., Harvey, Ill.

Cranes, Portable.

Northern Crane Works, Walkerville.
Whiting Foundry Equipment Co., Harvey, Ill.

Cranes, Swing Jib.

Northern Crane Works, Walkerville.
Smart-Turner Machine Co., Hamilton, Ont.
Whiting Foundry Equipment Co., Harvey, Ill.

Cranes, Transfer.

Northern Crane Works, Walkerville.
Smart-Turner Machine Co., Hamilton, Ont.
Whiting Foundry Equipment Co., Harvey, Ill.

Cranes, Wall.

Northern Crane Works, Walkerville.
Smart-Turner Machine Co., Hamilton, Ont.
Whiting Foundry Equipment Co., Harvey, Ill.

Cranes, Travelling Electric and Hand Power.

Dominion Bridge Co., Montreal.
Niles-Bement-Pond Co., New York.
Northern Crane Works, Walkerville.
Whiting Foundry Equipment Co., Harvey, Ill.

Crane, Chain.

Northern Crane Works, Walkerville.

Cranes, All Kinds.

Northern Crane Works, Walkerville.
Owen Sound Iron Works Co., Owen Sound, Ont.
Southwork Foundry & Machine Co., Philadelphia.
Whiting Foundry Equipment Co., Harvey, Ill.

Crank Pin Turning Machine.

Niles-Bement-Pond Co., New York.

Crimps, Leather.

Graton & Knight Mfg. Co., Montreal.

Cupolas.

Can. Buffalo Forge Co., Montreal.
Northern Crane Works, Walkerville.
Sheldons, Ltd., Galt, Ont.
Whiting Foundry Equipment Co., Harvey, Ill.

Cupola and Blast Gate Blowers.

Can. Sirocco Co., Ltd., Windsor, Ont.

Cupola Blast Gauges & Blowers.

Sheldons, Ltd., Galt, Ont.

Cutters, Angle, Tee Iron and Bar.

Can. Buffalo Forge Co., Montreal.

Cutters, Flue.

Independent Pneumatic Tool Co., Chicago.
Cleveland Pneumatic Tool Co. of Canada, Toronto.

Cutters, Pipe.

Can. Fairbanks-Morse Co., Montreal.
A. B. Jardine & Co., Hespeler, Ont.
Trimont Mfg. Co., Roxbury, Mass.

Cutting Compound & Cutting Oil.

Can. Economic Lubricant Co., Montreal.

Can. Oil Companies, Toronto.

Cataract Refining Co., Buffalo, N.Y.

Cruscent Oil Co., New York.

Racine Tool & Machine Co., Racine, Wis.

Cutter Grinders and Attachments

Cincinnati Milling Machine Co., Cincinnati.

Garrin Machine Co., New York.

Girard Machine & Tool Co., Philadelphia, Pa.

Cutters, Milling.

A. R. Williams Machy. Co., Toronto.
Can. Fairbanks-Morse Co., Montreal.
Cleveland Twist Drill Co., Cleveland.
Garvin Machine Co., New York.
Morse Twist Drill and Machine Co., New Bedford.
Tabor Mfg. Co., Philadelphia, Pa.
Pratt & Whitney Co., Dundas, Ont.
Wilt Twist Drill Co. of Canada, Ltd., Walkerville, Ont.

Cutting-off Machines.

Armstrong Bros. Tool Co., Chicago.
John Bertram & Sons Co., Dundas.
Can. Fairbanks-Morse Co., Montreal.
Espin-Lucas Machine Wks., Philadelphia, Pa.
Foss & Hill Machy. Co., Montreal.
Garlock-Machinery, Toronto.
Garvin Machine Co., New York.
Girard Machine & Tool Co., Philadelphia, Pa.
Geo. Gorton Machine Co., Racine, Wis.

Hurlbut, Rogers Machinery Co., South Sudbury, Mass.

John H. Hall & Sons, Brantford, Ont.

Nutter & Barnes Co., Hinsdale, N.H.

Pratt & Whitney Co., Dundas, Ont.

Tabor Mfg. Co., Philadelphia, Pa.

L. S. Starrett Co., Athol, Mass.

Damper Regulators.

Can. Fairbanks-Morse Co., Montreal.

Derricks.

Dominion Bridge Co., Montreal.
Wilt Twist Drill Co. of Canada, Ltd., Walkerville, Ont.

Designers, Special Machinery.

Baird Machine Co., Bridgeport, Conn.

Dies and Die Stocks.

Armstrong Mfg. Co., Bridgeport, Conn.
Banfield, W. H. & Son, Toronto.
Butterfield & Co., Rock Island, Que.
Brown, Boggs & Co., Hamilton, Ont.
Can. Fairbanks-Morse Co., Montreal.
Duncan Electrical Co., Montreal.
Gardner, Robt., & Son, Montreal.
Greenfield Tap & Die Corporation, Greenfield, Mass.
A. B. Jardine & Co., Hespeler, Ont.
Modern Tool Co., Erie, Pa.
Morse Twist Drill and Machine Co., New Bedford.
Pratt & Whitney Co., Dundas, Ont.
Wiley & Russell, Greenfield, Mass.

Dies for Bit Brace Use.

Wells Brothers Co., Greenfield, Mass.

Die Sinkers.

Garvin Machine Co., New York.

Dies for Machines.

Wells Brothers Co., Greenfield, Mass.

Die Sinking Presses, Hydraulic.

Charles F. Elmes Eng. Works, Chicago

Watson-Stillman Co., Aldene, N.J.

Dies, Self-opening.

Duncan Electrical Co., Montreal.
Geometric Tool Co., New Haven.
Greenfield Tap & Die Corporation, Greenfield, Mass.
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 Can. Fairbanks-Morse Co., Montreal.
 Duncan Electrical Co., Montreal.
 Greenfield Tap & Die Corporation,
 Greenfield, Mass.
 A. B. Jardine & Co., Hespeler, Ont.
 Landis Machine Co., Waynesboro, Pa.
 Modern Tool Co., Erie, Pa.
 Murchey Machine & Tool Co., De-
 troit.

Pratt & Whitney Co., Dundas, Ont.

Dies for Screw Plates.

Wells Brothers Co., Greenfield, Mass.

Dies, Sheet Metal Working.

E. W. Bliss Co., Brooklyn, N.Y.
 Brown, Boggs & Co., Hamilton, Can.

Dies, Screws and Thread.

Armstrong Mfg. Co., Bridgeport, Conn.
 Greenfield Tap & Die Corporation,
 Greenfield, Mass.
 Landis Machine Co., Waynesboro, Pa.
 Modern Tool Co., Erie, Pa.
 Murchey Machine & Tool Co., De-
 troit.

Discs, Leather.

Graton & Knight Mfg. Co., Montreal.

Draughtsman's Tools.

Emmert Mfg. Co., Waynesboro, Pa.

Drift, Mechanical.

W. H. Banfield & Sons, Toronto.
 Butterfield & Co., Rock Island, Que.
 Can. Buffalo Forge Co., Montreal.
 Can. Sirocco Co., Windsor, Ont.
 A. B. Jardine & Co., Hespeler, Ont.
 Pratt & Whitney Co., Dundas, Ont.
 Sheldons, Limited, Galt, Ont.

Drift Bolt Cutters.

Cleveland Pneumatic Tool Co. of
 Canada, Toronto.

Drill Presses.

Baker Bros., Toledo, O.
 W. F. & John Barnes Co., Rockford,
 Ill.
 Can. Buffalo Forge Co., Montreal.
 Foss & Hill Machy. Co., Montreal.
 Hill, Clarke & Co. of Chicago, Chi-
 cago, Ill.
 Garvin Machine Co., New York.
 Girard Machine & Tool Co., Phila-
 delphia, Pa.
 Niles-Bement-Pond Co., New York.
 A. R. Williams Machinery Co., To-
 ronto.

**Drilling Machines, Locomotive
and Multiple Spindle**

Baker Bros., Toledo, O.
 Barnes Drill Co., Rockford, Ill.
 John Bertram & Sons Co., Dundas.
 Can. Buffalo Forge Co., Montreal.
 Can. Fairbanks-Morse Co., Montreal.
 Garlock Machinery, Toronto.
 Garvin Machine Co., New York.
 Girard Machine & Tool Co., Phila-
 delphia, Pa.
 A. B. Jardine & Co., Hespeler, Ont.
 Niles-Bement-Pond Co., New York.

**Drilling Machines, Radial
and Turret.**

Baker Bros., Toledo, O.
 Barnes Drill Co., Rockford, Ill.
 John Bertram & Sons Co., Dundas.
 Can. Fairbanks-Morse Co., Montreal.
 Moteb & Merryweather Machy. Co.,
 Cleveland, O.
 Niles-Bement-Pond Co., New York.
 Turner Machine Co., Danbury, Conn.

Drilling Machines, Sensitive.

Baker Bros., Toledo, O.
 W. F. & John Barnes Co., Rockford,
 Ill.
 Can. Fairbanks-Morse Co., Montreal.
 Niles-Bement-Pond Co., New York.
 Rockford Machine Tool Co., Rockford,
 Ill.

**Drilling Machines, Upright
and Horizontal.**

Baker Bros., Toledo, O.
 Barnes Drill Co., Rockford, Ill.
 Colburn Mach. Tool Co., Franklin, Pa.
 A. R. Williams Machy. Co., Toronto.
 W. F. & John Barnes Co., Rockford,
 Ill.
 John Bertram & Sons Co., Dundas.
 Garlock Machinery, Toronto.
 Girard Machine & Tool Co., Phila-
 delphia, Pa.
 A. B. Jardine & Co., Hespeler, Ont.
 Rockford Machine Tool Co., Rockford,
 Ill.
 R. McDougall Co., Galt.
 Moteb & Merryweather Machy. Co.,
 Cleveland, O.
 Niles-Bement-Pond Co., New York.

Drilling Posts.

Keystone Mfg. Co., Buffalo, N.Y.

Drills, Bench.

W. F. & John Barnes Co., Rockford,
 Ill.
 Can. Buffalo Forge Co., Montreal.
 Can. Fairbanks-Morse Co., Montreal.
 Pratt & Whitney Co., Dundas, Ont.
 United States Electrical Tool Co.,
 Cincinnati.

Drills, Blacksmith and Bit Stock.

Can. Buffalo Forge Co., Montreal.
 Cleveland Twist Drill Co., Cleveland.
 A. B. Jardine & Co., Hespeler, Ont.
 Morse Twist Drill and Machine Co.,
 New Bedford.
 Wilt Twist Drill Co., of Canada, Ltd.,
 Walkerville, Ont.

Drills, Centre.

Cleveland Twist Drill Co., Cleveland.
 Morse Twist Drill and Machine Co.,
 New Bedford.
 Pratt & Whitney Co., Dundas, Ont.
 L. S. Starrett Co., Athol, Mass.
 Wilt Twist Drill Co., of Canada, Ltd.,
 Walkerville, Ont.

Drills Corner (Pneumatic).

Cleveland Pneumatic Tool Co. of
 Canada, Toronto.

Drills, Electric and Portable.

A. R. Williams Machy. Co., Toronto.
 Can. Buffalo Forge Co., Montreal.
 Niles-Bement-Pond Co., New York.
 Stow Mfg. Co., Binghamton, N.Y.
 United States Electrical Tool Co.,
 Cincinnati, O.

Drills, High Speed.

Baker Bros., Toledo, O.
 Cleveland Twist Drill Co., Cleveland.
 Can. Fairbanks-Morse Co., Montreal.
 Morse Twist Drill and Machine Co.,
 New Bedford.
 W. F. & John Barnes Co., Rockford,
 Ill.
 Pratt & Whitney Co., Dundas, Ont.
 Whitman & Barnes Mfg. Co., St.
 Catharines, Ont.
 Wilt Twist Drill Co., of Canada, Ltd.,
 Walkerville, Ont.

Drills, Multiple Spindle.

Pratt & Whitney Co., Dundas, Ont.
 Niles-Bement-Pond Co., New York.

Drills, Oil Tube.

Cleveland Twist Drill Co., Cleveland.
 Morse Twist Drill and Machine Co.,
 New Bedford.

Drills, Pneumatic.

John F. Allen Co., New York.
 Cleveland Pneumatic Tool Co. of
 Canada, Toronto.
 Independent Pneumatic Tool Co.,
 Chicago, Ill.
 Niles-Bement-Pond Co., New York.

Drills, Ratchet and Hand.

Armstrong Bros. Tool Co., Chicago.
 Can. Buffalo Forge Co., Montreal.
 Can. Fairbanks-Morse Co., Montreal.
 Cleveland Twist Drill Co., Cleveland.
 A. B. Jardine & Co., Hespeler, Ont.
 Morse Twist Drill and Machine Co.,
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 Pratt & Whitney Co., Dundas, Ont.
 Wilt Twist Drill Co. of Canada, Ltd.,
 Walkerville, Ont.

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 Cleveland Pneumatic Tool Co. of
 Canada, Toronto.

Drills, Track.

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 New Bedford.
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 Can. Sirocco Co., Ltd., Windsor, Ont.
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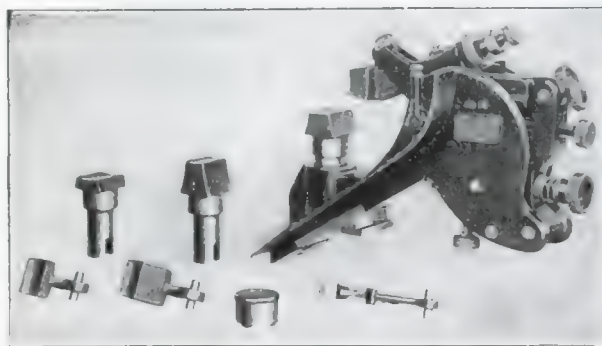
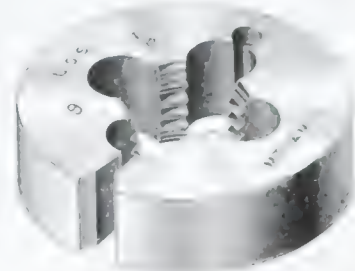


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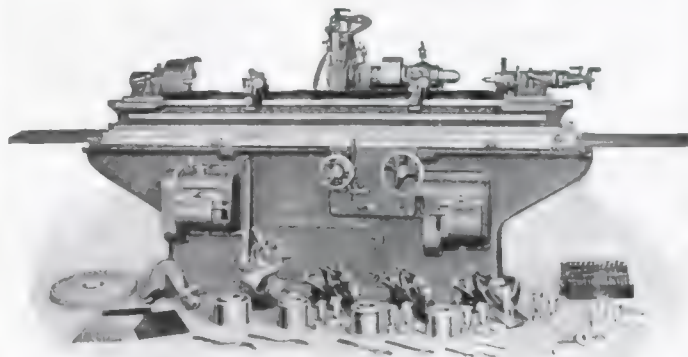
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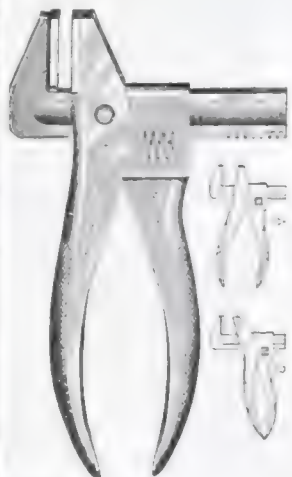


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Ker & Goodwin, Brantford.

Lamps, Tungsten.

Lintz-Porter Co., Toronto.

Lathe Chucks.

Ker & Goodwin, Brantford.

Lathe Attachment for Shells.

Lymburner, Ltd., Montreal.

Lathes, Automatic.

Windsor Machine Co., Windsor, Vt.

Lathe Dogs and Attachments.

Armstrong Bros. Tool Co., Chicago.
Fay & Scott, Dexter, Maine.
Hendey Machine Co., Torrington, Conn.
National Forge & Tool Co., Erie, Pa.
J. H. Williams Co., Brooklyn, N.Y.

Lathes, Bench.

W. F. & John Barnes Co., Rockford, Blount, J. G., & Co., Everett, Mass.
Can. Fairbanks-Morse Co., Montreal.
Pratt & Whitney Co., Dundas, Ont.

Lathes, Band Turning.

Jenckes Machine Co., Sherbrooke, Que.

Lathes, Engine.

A. R. Williams Machy. Co., Toronto.
W. F. & John Barnes Co., Rockford, Ill.
John Bertram & Sons Co., Dundas.
Can. Fairbanks-Morse Co., Montreal.
Cincinnati Iron & Steel Co., Cincinnati, O.
Fay & Scott, Dexter, Maine.
Foss & Hill Machy. Co., Montreal.
Gardner, Robt., & Son, Montreal.
Garlock-Machinery, Toronto.
Garvin Machine Co., New York.
Garrod Machine & Tool Co., Philadelphia, Pa.
Hendey Machine Co., Torrington, Conn.
Hill, Clarke & Co., of Chicago, Chicago, Ill.
R. McDougall Co., Galt.
Motch & Merryweather Machy. Co., Cleveland, O.
Niles-Bement-Pond Co., New York.
Pratt & Whitney Co., Dundas, Ont.

Lathe Pans.

New Britain Machine Co., New Britain, Conn.

Lathes, Patternmakers'.

J. G. Blount Co., Everett, Mass.
Fay & Scott, Dexter, Maine.
Foss & Hill Machy. Co., Montreal.
Garlock-Machinery, Toronto.
Mussens, Limited, Montreal.

Lathes, Roll Turning

Mesta Machine Co., Pittsburgh.

Lathes, Screw Cutting.

A. R. Williams Machy. Co., Toronto.
John Bertram & Sons Co., Dundas.
Cincinnati Iron & Steel Co., Cincinnati, O.
Garrod Machine & Tool Co., Philadelphia, Pa.
Motch & Merryweather Machy. Co., Cleveland, O.
Niles-Bement-Pond Co., New York.

Lathes, Spinning.

Bliss, E. W., Co., Brooklyn, N.Y.
Toledo Mach. & Tool Co., Toledo, O.

Lathe, Turret and Speed.

John Bertram & Sons Co., Dundas.
Blount, J. G., & Co., Everett, Mass.
Brown & Sharpe Mfg. Co., Providence, R.I.
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Cincinnati Iron & Steel Co., Cincinnati, O.
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Foss & Hill Machy. Co., Montreal.
Garlock-Machinery, Toronto.

Garvin Machine Co., New York.
Girard Machine & Tool Co., Philadelphia, Pa.
Motch & Merryweather Machy. Co., Cleveland, O.
New Britain Machine Co., New Britain, Conn.
Niles-Bement-Pond Co., New York.
Pratt & Whitney Co., Dundas, Ont.
Warner & Swasey Co., Cleveland, O.
Windsor Machine Co., Windsor, Vt.
A. R. Williams Machy. Co., Toronto.

Leather Strapping.

Graton & Knight Mfg. Co., Montreal.

Lifts, Pneumatic.

Whiting Foundry Equipment Co., Harvey, Ill.

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Lintz-Porter Co., Toronto.

Link Belting.

Can. Fairbanks-Morse Co., Montreal.
Graton & Knight Mfg. Co., Montreal.
Jones & Glasco, Montreal.

Linoleum Mill Machinery.

Bertrams, Ltd., Edinburgh, Scotland.

Liquid Air.

L'Air Liquide Society, Montreal, Toronto.
Lever Bros., Toronto.

Lockers, Steel Wardrobe and Steel Material.

Canada Wire & Iron Goods Co., Hamilton, Ont.
Dennis Wire & Iron Works Co., Ltd., London, Canada.

Lockers.

Canada Wire & Iron Goods Co., Hamilton, Ont.
Dennis Wire & Iron Works Co., Ltd., London, Canada.

Locomotive Equipment.

Can. Locomotive Co., Kingston, Ont.

Locomotives, Railroad, Contracting.

Can. Locomotive Co., Kingston, Ont.
National Machinery & Supply Co., Hamilton.

Lubricants.

S. F. Rowser & Co., Fort Wayne, Ind.
Can. Economic Lubricant Co., Montreal.
Can. Oil Company, Toronto.
Cataract Refining Co., Toronto.
Crescent Oil Co., Inc., New York.

Machine Tools.

Brown & Sharpe Mfg. Co., Providence, R.I.
Can. Fairbanks-Morse Co., Montreal.
Can. Machinery Corp., Galt, Ont.
Garlock-Machinery, Toronto.
Modern Tool Co., Erie, Pa.
Niles-Bement-Pond Co., New York.
Pratt & Whitney Co., Dundas, Ont.
J. H. Williams Co., Brooklyn, N.Y.

Machinery Dealers.

Can. Fairbanks-Morse Co., Montreal.
Garlock-Machinery, Toronto.
Hill, Clarke & Co., of Chicago.
Marshall & Huchart Machinery Co., Chicago.
National Machinery & Supply Co., Hamilton.
Frank Toomey, Inc., New York.
A. R. Williams Machy. Co., Toronto.
New York Machinery Exchange, New York.

Machinery Guards.

Jones & Glasco, Montreal, P.Q.
Canada Wire & Iron Goods Co., Hamilton, Ont.
A. R. Williams Machy. Co., Toronto.

Machinery Repairs.

Cunningham & Sons, St. Catharines, Ont.

Plessisville Foundry, Plessisville, Que.

Machinists' Scales, Small Tools and Supplies.

Can. Fairbanks-Morse Co., Montreal.
Frank H. Scott, Montreal.
J. H. Williams & Co., Brooklyn, N.Y.

Magnets.

Lintz-Porter Co., Toronto.

Mandrels.

Can. Fairbanks-Morse Co., Montreal.
Cleveland Twist Drill Co., Cleveland.
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Pratt & Whitney Co., Dundas, Ont.
Wilt Twist Drill Co. of Canada, Ltd., Walkerville, Ont.

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Cunningham & Sons, St. Catharines, Ont.

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Brown, Boggs Co., Hamilton, Ont.
Noble & Westbrook Mfg. Co., Hartford, Conn.

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Dennis Wire & Iron Works, London, Ont.

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James Chesterman & Co., Ltd., Sheffield, Eng.

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Toronto Testing Laboratory, Ltd., Toronto.

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Hurlbut, Rogers Machinery Co., South Sudbury, Mass.
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Duncan Electrical Co., Montreal.

Meters, Electrical.

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Alexander Fleck, Ltd., Ottawa.

Milling Attachments.

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Hendey Mach. Co., Torrington, Conn.

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Pratt & Whitney Co., Dundas, Ont.

Rockford Milling Machine Co., Rockford, Ill.

Milling Machines, Horizontal and Vertical.

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Hill, Clarke & Co., of Chicago, Chicago, Ill.

John Bertram & Sons Co., Dundas.

Foss & Hill Machy. Co., Montreal.

Girard Machine & Tool Co., Philadelphia, Pa.

Gooley & Edlund, Cortland, N.Y.

Kemp Smith Mfg. Co., Milwaukee, W. Me.

Motch & Merryweather Machy. Co., Cleveland, O.

Niles-Bement-Pond Co., New York.

Pratt & Whitney Co., Dundas, Ont.

Rockford Milling Machine Co., Rockford, Ill.

Milling Machines, Plain, Bench and Universal.

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Cincinnati Milling Machine Co., Cincinnati.

Foss & Hill Machy. Co., Montreal.

Garvin Machine Co., New York.

Gooley & Edlund, Cortland, N.Y.

Hill, Clarke & Co., of Chicago, Chicago, Ill.

Hendey Machine Co., Torrington.

Kemp Smith Mfg. Co., Milwaukee, Wis.

Mesta Machine Co., Pittsburgh, Pa.

Motch & Merryweather Machy. Co., Cleveland, O.

Niles-Bement-Pond Co., New York.

Pratt & Whitney Co., Dundas, Ont.

Rockford Milling Machine Co., Rockford, Ill.

A. R. Williams Machy. Co., Toronto.

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Can. Fairbanks-Morse Co., Montreal.
Foss & Hill Machy. Co., Montreal.

Garvin Machine Co., New York.

Girard Machine & Tool Co., Philadelphia, Pa.

Mesta Machine Co., Pittsburgh, Pa.

Motch & Merryweather Machy. Co., Cleveland, O.

Pratt & Whitney Co., Dundas, Ont.

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Geometric Tool Co., New Haven, Conn.
Kemp Smith Mfg. Co., Milwaukee, W.

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Pratt & Whitney Co., Dundas, Ont.
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Can. Fairbanks-Morse Co., Montreal.

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Mesta Machine Co., Pittsburgh, Pa.

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Can. Fairbanks-Morse Co., Montreal.
Lanshine Dynamo & Motor Co., Ltd., Toronto.

Lintz-Porter Co., Toronto.

Toronto & Hamilton Electric Co., Hamilton, Ont.

Motors, Pneumatic.

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Independent Pneumatic Tool Co., Chicago.

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Landis Machine Co., Waynesboro, Pa.

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National Mach. & Sup. Co., Hamilton

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Oven Equipment & Mfg. Co., New Haven, Conn.

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Oven Equipment & Mfg. Co., New Haven, Conn.

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Lever Bros., Toronto.

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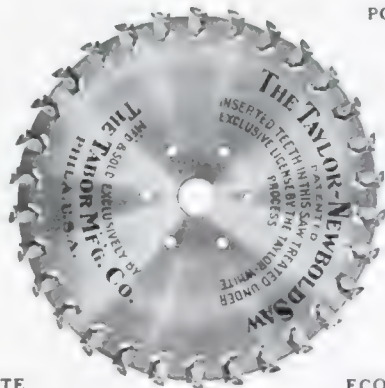
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 Toledo Machine & Tool Co., Toledo.

Presses, Broaching.

E. W. Bliss Co., Brooklyn, N.Y.
 Toledo Machine & Tool Co., Toledo.

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Presses, Drop.

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 Girard Machine & Tool Co., Philadelphia, Pa.

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Mesta Machine Co., Pittsburg, Pa.
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 Southwark Foundry & Machine Co., Philadelphia, Pa.

Wm. Tod Company, Youngstown, O.
 Toledo Machine & Tool Co., Toledo.

Watson-Stillman Co., Aldene, N.J.

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Toledo Machine & Tool Co., Toledo.

Presses, Power.

Baird Machine Co., Bridgeport, Conn.

Can. Boomer & Boschert Press Co., Montreal.

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 Brown, Boggs & Co., Hamilton, Can.

Can. Fairbanks-Morse Co., Montreal.
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Geo. Gorton Machine Co., Racine.
 Girard Machine & Tool Co., Philadelphia, Pa.

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Southwark Foundry & Machine Co., Philadelphia.

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Can. Fairbanks-Morse Co., Montreal.

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Pratt & Whitney Co., Dundas, Ont.

Toledo Machine & Tool Co., Toledo, O.

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Bliss, E. W. Co., Brooklyn, N.Y.

Brown, Boggs Co., Ltd., Hamilton, Canada.

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Morse Twist Drill & Machine Co., New Bedford.

Pratt & Whitney Co., Dundas, Ont.

Whitman & Barnes Mfg. Co., St. Catharines, Ont.

Wilt Twist Drill Co. of Canada, Ltd., Walkerville, Ont.

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Cleveland Pneumatic Tool Co., of Canada, Toronto.

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A. B. Jardine & Co., Hespeler, Ont.

Morse Twist Drill & Machine Co., New Bedford.

Pratt & Whitney Co., Dundas, Ont.

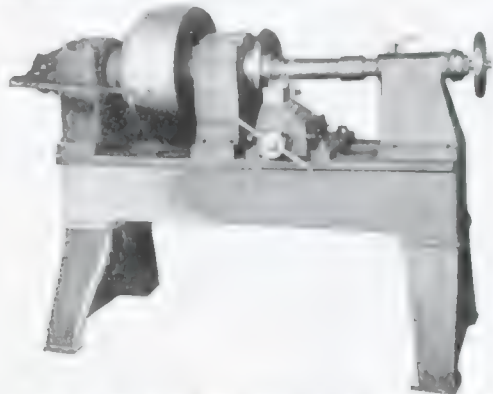
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The machine is of such a design that it can be used for the production of shells of any size, from 1/2 inch to 1 1/2 inches in diameter. The machine is of such a design that it can be used for the production of shells of any size, from 1/2 inch to 1 1/2 inches in diameter. The machine is of such a design that it can be used for the production of shells of any size, from 1/2 inch to 1 1/2 inches in diameter.

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16 in. Lever POST DRILL

A Giant Little Machine
For Light Drilling.

Will drill up to 7/8 inch.

An adjustable friction is provided for the feed shaft, which acts as a balance to the weight of the spindle.

Revel Gears, Feed Pinion and smoothly and without noise.

Run of feed 3 1/4 inches.

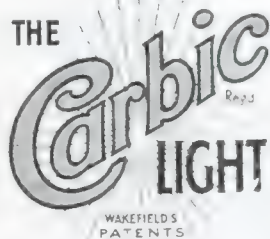
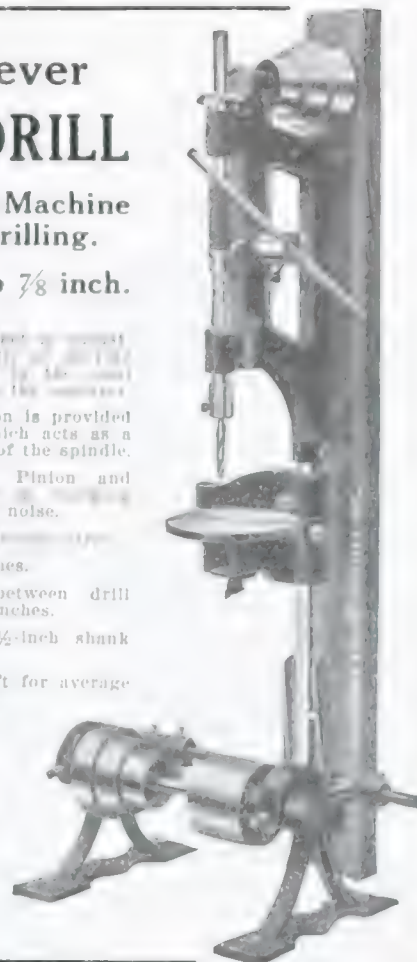
Greatest distance between drill spindle and table, 23 inches.

Spindle bored for 1/2-inch shank twist drills.

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Scott Bros., Halifax, Eng.
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Kellogg & Co., Toronto.

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Frank Toomey, Inc., Philadelphia, Pa.
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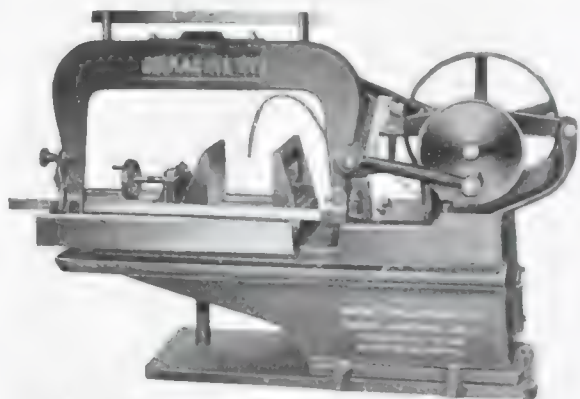
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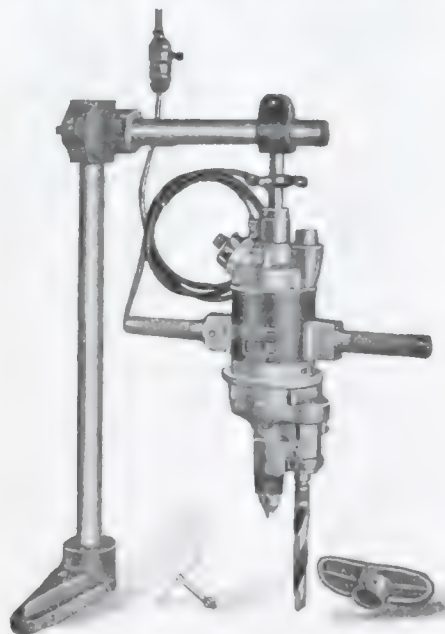
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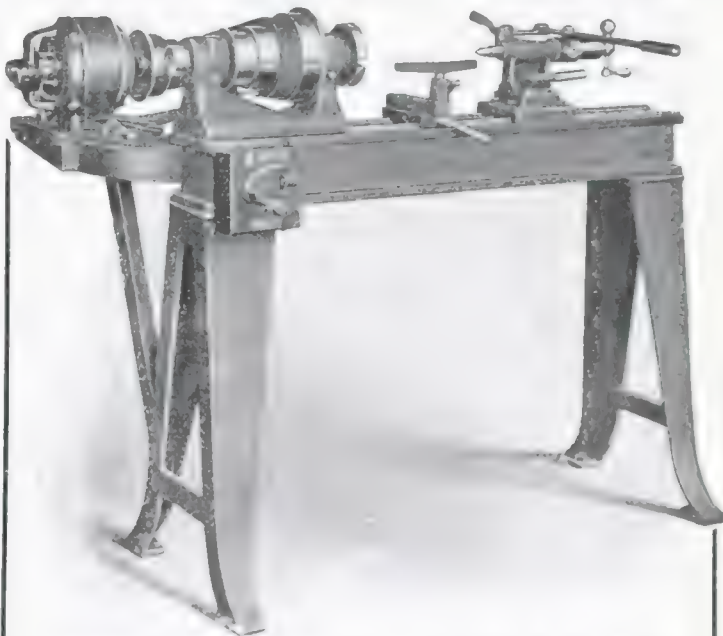
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Motor Driven Speed Lathe

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Morse Twist Drill & Machine Co., New Bedford.
Murphy Machine & Tool Co., Detroit.
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Tool Posts, Lathe.

Armstrong Bros. Tool Co., Chicago.

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Hawkrige Bros. Co., Boston, Mass.
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National Mach. & Sup. Co., Hamilton.
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A. R. Williams Machy. Co., Toronto.
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Armstrong Bros. Tool Co., Chicago.

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Witt Twist Drill Co. of Canada, Ltd., Walkerville, Ont.

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Watson-Stillman Co., Aldene, N.J.

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Baird Machine Co., Bridgeport, Conn.
Northern Crane Works, Walkerville.
Whiting Foundry Equipment Co., Harvey, Ill.

Turbines, Steam.

Southwark Foundry & Machine Co., Philadelphia, Pa.

Turnbuckles.

Canadian Billings & Spencer, Ltd., Welland.
Can. H. W. Johns-Manville Co., Ltd., Toronto.

Turret Machines.

Brown & Sharpe Mfg. Co., Providence, R.I.
Fay & Scott, Dexter, Me.
Girard Machine & Tool Co., Philadelphia, Pa.
Hill, Clarke & Co. of Chicago, Chicago, Ill.
Mott & Merryweather Machy. Co., Cleveland, O.
New Britain Machine Co., New Britain, Conn.
Pratt & Whitney, Hartford, Conn.
Turner Machine Co., Ltd., Danbury, Conn.
Warner & Swasey, Cleveland, O.

Turbines, Steam, Water.

Plessisville Foundry, Plessisville, Que.

Upsetting and Bending**Machinery.**

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John Bertram & Sons Co., Dundas, Ont.
Brown, Boggs Co., Ltd., Hamilton, Canada.
A. B. Jardine & Co., Hespeler.
National Machy. Co., Tiffin, O.
Niles-Bement-Pond Co., New York.
Watson-Stillman Co., Aldene, N.J.

Vacuum Pumps.

Buffalo Forge Co., Buffalo, N.Y.
Mesta Machine Co., Pittsburgh.
Smart-Turner Machine Co., Hamilton, Ont.

Valve Grinders (Pneumatic).

Cleveland Pneumatic Tool Co. of Canada, Toronto.

Valves, Hydraulic.

Can. Bommer & Boschert Press Co., Montreal.
Charles F. Elmes Eng. Works, Chicago, Ill.
Mesta Machine Co., Pittsburgh, Pa.
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R. D. Wood & Co., Philadelphia, Pa.

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Graton & Knight Mfg. Co., Montreal.

Valves, Back Pressure, Steam.

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Sheldons, Limited, Galt.

Vanadium Steel.

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Hawkrige Bros. Co., Boston, Mass.

Ventilating Apparatus.

Can. Sirocco Co., Ltd., Windsor, Ont.
Sheldons, Limited, Galt.
A. R. Williams Machy. Co., Toronto.

Vises, Bench.

Emmert Mfg. Co., Waynesboro, Pa.
Hollands Mfg. Co., Erie, Pa.
National Mach. & Sup. Co., Hamilton.
New Britain Machine Co., New Britain, Conn.

Vises, Pipe.

Armstrong Mfg. Company, Bridgeport, Conn.
Bignall & Keeler Mach. Works, Edwardsville, Ill.
Butterfield & Co., Rock Island, Que.
Emmert Mfg. Co., Waynesboro, Pa.
National Mach. & Sup. Co., Hamilton.
J. H. Williams Co., Brooklyn, N.Y.

Vises, Planer and Shaper.

Girard Machine & Tool Co., Philadelphia, Pa.
National Mach. & Sup. Co., Hamilton.
Skinner Chuck Co., New Britain, C.

Vises, Milling Machine.

National Mach. & Sup. Co., Hamilton.

Vises, Woodworking.

Emmert Mfg. Co., Waynesboro, Pa.

Washers.

Graton & Knight Mfg. Co., Worcester, Mass.
London Bolt & Hinge Works, London, Ont.
Wallace, Barnes Co., Bristol, Conn.

Washer Machines.

National Machy. Co., Tiffin, Ohio.

Waterproof Coating, Cement,**Fabric.**

Can. H. W. Johns-Manville Co., Ltd., Toronto.

Watchman's Clocks.

Lantz-Porter Co., Toronto.
A. R. Williams Machy. Co., Toronto.

Water Towers.

Toronto Iron Works, Ltd., Toronto.

Welding and Cutting Clamps.

Can. Blaugas Co., Ltd., Montreal.
Detroit Electric Welder Co., Detroit, Mich.
L'Air Liquide Society, Toronto.
Lever Bros., Toronto.
National Electric Welder Co., Cincinnati, O.

Welding and Cutting Work.

Can. Blaugas Co., Ltd., Montreal.
Detroit Electric Welder Co., Detroit, Mich.
L'Air Liquide Society, Toronto.
Lever Bros., Toronto.
Metals Welding Co., Cleveland, O.
National Electric Welder Co., Cincinnati, O.

Welding, Autogenous.

Can. Blaugas Co., Ltd., Montreal.
Detroit Electric Welder Co., Detroit, Mich.
L'Air Liquide Society, Toronto.
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Metals Welding Co., Cleveland, O.
National Electric Welder Co., Cincinnati, O.

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Detroit Electric Welder Co., Detroit, Mich.
L'Air Liquide Society, Toronto.
Lever Bros., Toronto.
Metals Welding Co., Cleveland, O.
National Electric Welder Co., Cincinnati, O.

Welding Machines, Electric, etc

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Detroit Electric Welder Co., Detroit, Mich.
L'Air Liquide Society, Toronto.
Lever Bros., Toronto.
National Electric Welder Co., Cincinnati, O.
Tabor Mfg. Co., Philadelphia, Pa.

Wheels, Emery, Carborundum.

Can. Hart Wheels, Ltd., Hamilton, Ont.

Wheels, Belt, Fly, Gear

and Rope.
Mesta Machine Co., Pittsburgh, Pa.

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John H. Hall & Sons, Brantford.
Northern Crane Works, Walkerville.

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Canada Wire & Iron Goods Co., Hamilton.

Wire Cloth and Perforated**Metals.**

Canada Wire & Iron Goods Co., Hamilton.
Dennis Wire & Iron Works Co., Ltd., London.

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Wallace, Barnes Co., Bristol, Conn.

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F. B. Shuster Co., New Haven, Conn.
Baird Machine Co., Bridgeport, Conn.

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Canada Wire & Iron Goods Co., Hamilton, Ont.

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Parmenter & Bulloch Co., Gananeque.

Wire Nail Machinery.

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A. R. Williams Machy. Co., Toronto.

Wire, Spring.

Wallace, Barnes Co., Bristol, Conn.

Wire Straighteners and Cutters.

Baird Machine Co., Bridgeport, Conn.
Brown, Boggs Co., Ltd., Hamilton, Canada.
F. B. Shuster Co., New Haven, Conn.

Wire Coiling and Pointing**Machines.**

Baird Machine Co., Bridgeport, Conn.
F. B. Shuster Co., New Haven, Conn.

Wood Boring Machines.

Cleveland Pneumatic Tool Co. of Canada, Toronto.
Garlock-Machinery, Toronto.
Girard Machine & Tool Co., Philadelphia, Pa.

Woodworking Machinery.

Buffalo Forge Co., Buffalo, N.Y.
Can. Fairbanks-Morse Co., Montreal.
Garlock-Machinery, Toronto.
Girard Machine & Tool Co., Philadelphia, Pa.
New Britain Machine Co., New Britain, Conn.
Plessisville Foundry, Plessisville, Que.
A. R. Williams Machy. Co., Toronto.

Wrenches, Compression.

Lutz-Webster Engineering Co., Inc., Philadelphia, Pa.

Wrenches.

Armstrong Bros. Tool Co., Chicago, Ill.
Butterfield & Co., Rock Island, Que.
Canadian Billings & Spencer, Ltd., Welland.
Keystone Mfg. Co., Buffalo, N.Y.
Lutz-Webster Engineering Co., Inc., Philadelphia, Pa.
Wells Bros. Co., Greenfield, Mass.
J. H. Williams Co., Brooklyn, N.Y.

Wrenches, Automobile Narrow**Jaw and Monkey.**

Bemis & Call Hardware & Tool Co., Springfield, Mass.
Trimont Mfg. Co., Roxbury, Mass.

Wrenches, Pipe, Monkey.

Bemis & Call Hardware & Tool Co., Springfield, Mass.
Trimont Mfg. Co., Roxbury, Mass.

Wrenches, Ratchet and Basin.

Bemis & Call Hardware & Tool Co., Springfield, Mass.
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Our Newly Designed**Shrapnel Shell
Cleaning Machine**

Cleans all **Standard** Sizes
and accommodates various **other** sizes

The table of this machine has six shell pockets. Three of these are in the Blasting Department, and the other three, as shown in the illustration, are in the open. Thus, while three of the shells are being cleaned, the operator can remove the other three that have been cleaned, replacing them with three more to be blasted.

Consequently the machine can be kept in constant operation.

This machine, if connected to any exhaust system, will be nearly dustless and absolutely automatic in operation.

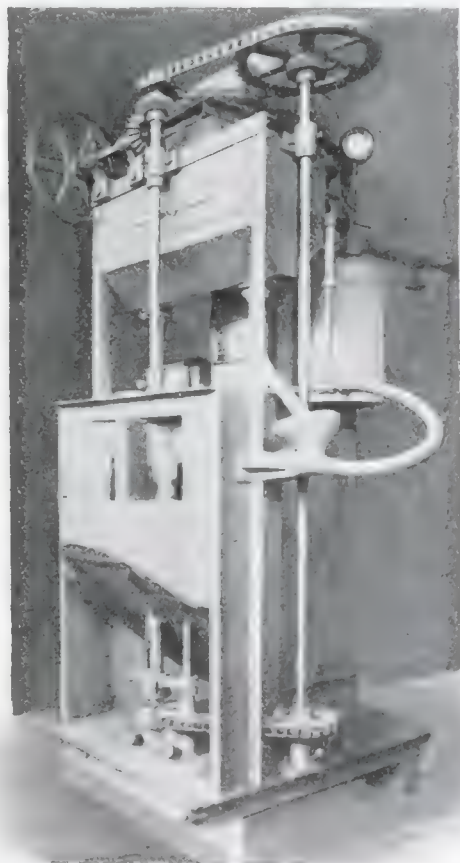
On the sand blasting table proper the division plates are lined with wood. This protects the steel plate. The wood is inexpensive and easily replaced.

The machine is so designed that the copper band groove is blasted on the exterior of the shell and another nozzle blasts the upper part of the exterior of the shell.

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We are anxious to tell you all about it.

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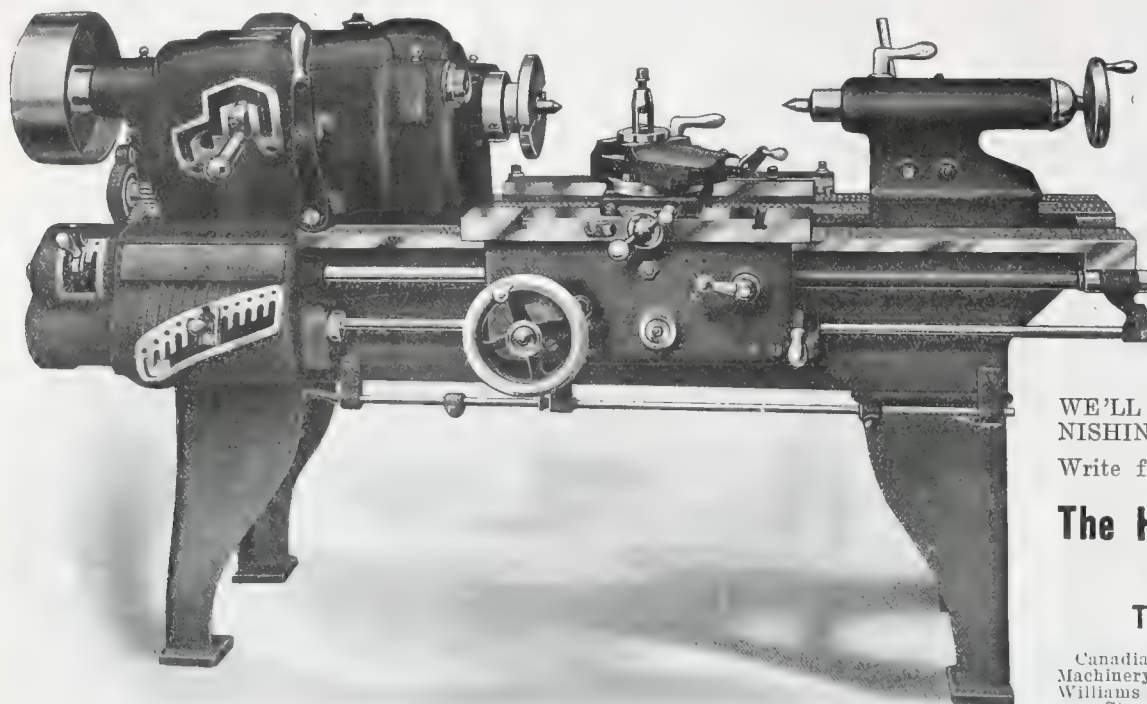
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on exorbitant prices—our aim is a good,
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when we will supply you with such tools
as you may require.

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36 DIFFERENT THREADS AND FEEDS are had through Mounted Change Gearing, each change being quickly made through controlling handles in Gear Boxes.

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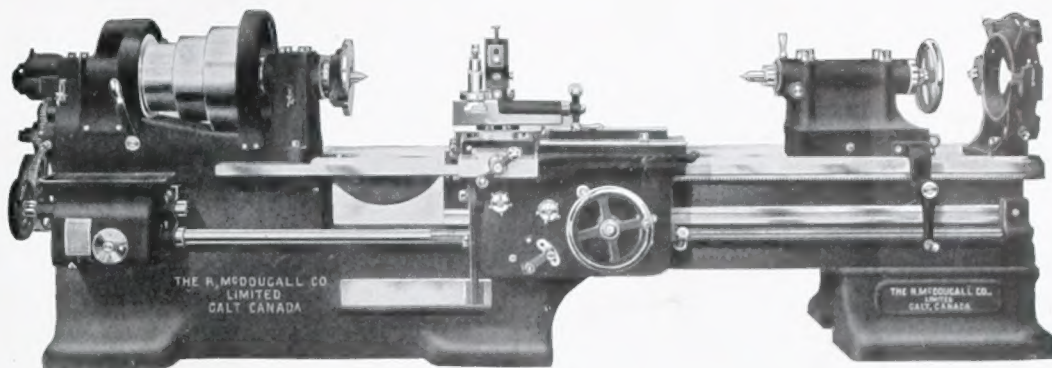
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ADVERTISING INDEX

Allen Mfg. Co.	47	Garvin Machine Co.	46	Nicholson File Co.	14
Amalgamated Machy. Corporation ...	18	Geometric Tool Co. ....Front cover		Noble & Westbrook Mfg. Co.	45
American Pulley Co.	13	Girard Machine & Tool Co.	44	Northern Crane Works	12
Armstrong Bros. Tool Co.	47	Gorton Machine Co., Geo.	43	Norton, A. O.	47
Armstrong Mfg. Co.	45			Norton Company	15
		Hamilton Gear & Machine Co.	46	Ohio Iron & Metal Co.	41
Baird Machine Co.	47	Hanna & Co., M. A.	51	Oven Equipment & Mfg. Co.	7
Banfield & Sons, W. H.	44	Hawkrige Brothers Company	51		
Barnes & Co., Wallace	59	Hendey Machine Co.	64	Parmenter & Bulloch Co., The	12
Bertram, John, & Sons Co.	1	Hill, Clarke Co.	48	Perrin, Wm. R., Ltd.	46
Blount, J. G., Co.	61	Hurlbut, Rogers Machy. Co.	45	Plessisville Foundry	45
Brown & Sharpe Mfg. Co.	53			Positive Clutch & Pulley Works	46
		International Time Recording Co.		Pratt & Whitney Co. ....Inside front cover	
Canada Machinery Agency	47	Jardine, A. B., & Co.	59	Puro Sanitary Drinking Fountain Co.	42
Can. Drawn Steel Co.	45	Jenckes Machine Co.	59		
Can. Economic Lubricant Co.	13			Racine Tool & Machine Co.	61
Can. Hoskins, Ltd.	9	Kellogg & Co.	3	Root, C. J., Co.	47
Can. H. W. Johns-Manville Co.	57			Rumely-Wachs Mach. Co.	47
Canadian Testing & Inspection Laboratories, Ltd.	47	Lackawanna Steel Co.	61		
Chicago Flexible Shaft Co.	5	Landis Machine Co.	47	Shore Instrument & Mfg. Co.	45
Cook Co., Asa S.	46	Leslie, A. C., & Co., Ltd.	44	Shuster Co., F. B.	46
Cramp, Wm., & Sons, Ship and Engine Building Co.	8	Lever Bros., Ltd.	57	Sly, W. W., Mfg. Co.	63
Crescent Oil Company	12	Lymburner, Ltd.	15	Southwark Foundry & Machine Co.	39
Cushman Chuck Co.	57			Starrett Co., L. S.	55
		Main Belting Co.	13	Stow Mfg. Co.	61
Darling Brothers, Limited	12	Marion & Marion	42		
Dennis Wire & Iron Works Co.	43	Marshall & Husehart Machy. Co.	41	Tabor Mfg. Co.	57
Dominion Stamping Co.	43	McDougall Co., R. ....Inside back cover		Tate-Jones & Co., Inc.	4
		McLaren Belting Co., J. C.	47	Thwing Instrument Co.	46
Elmes Eng. Works, Charles F.	51	Mesta Machine Co. ....Outside back cover		Toronto Iron Works	47
		Modern Tool Co.	11	Toronto Testing Laboratories	46
Fay & Scott	15	Morse Twist Drill & Machine Co.	53		
Foster, W. L.	59	Morton Mfg. Co.	42	Warner & Swasey	10
		Murchev Machine & Tool Co.	6	Watson-Stillman Co., The	8
Gardner Machine Co.	46			Wells Bros. of Canada, Ltd.	14
Garlock-Machinery	10	New Britain Machine Co.	9	Whiting Foundry Equipment Co.	51
		New York Machinery Exchange	63	Williams, J. H., & Co.	16

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Strength
Accuracy
Quality



Take a look at the next money you intend to invest in a Lathe.
Then, take a look at the money's worth we offer you in our machine.
Your money will soon come back to you in increased production and we will have the pleasure of having a satisfied user. Our machines are just as good as they look and they look good too.
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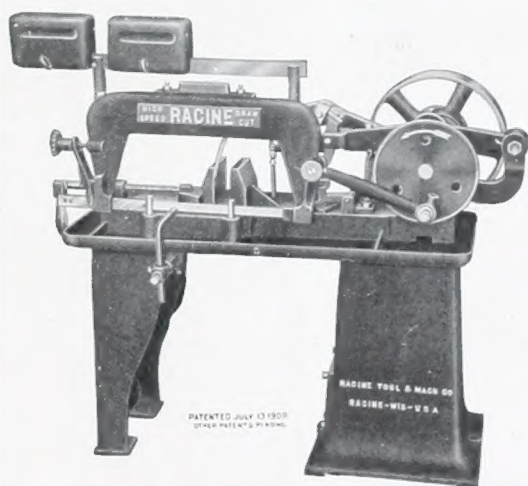
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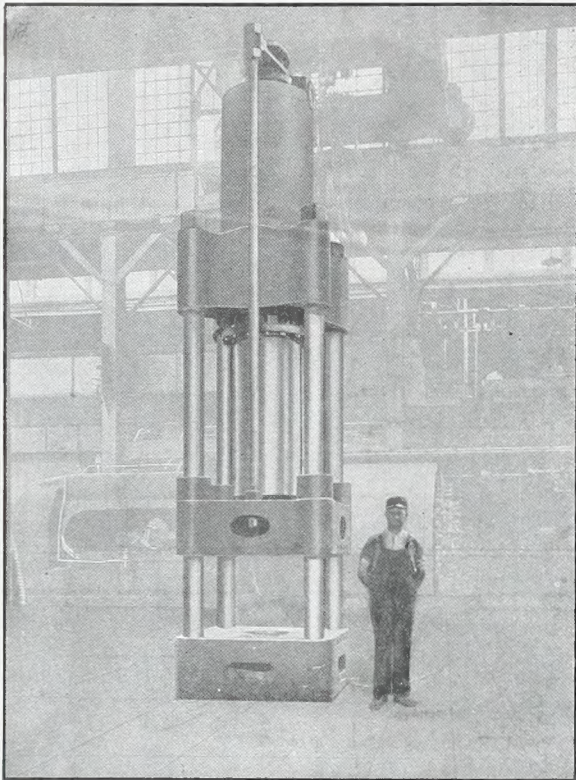
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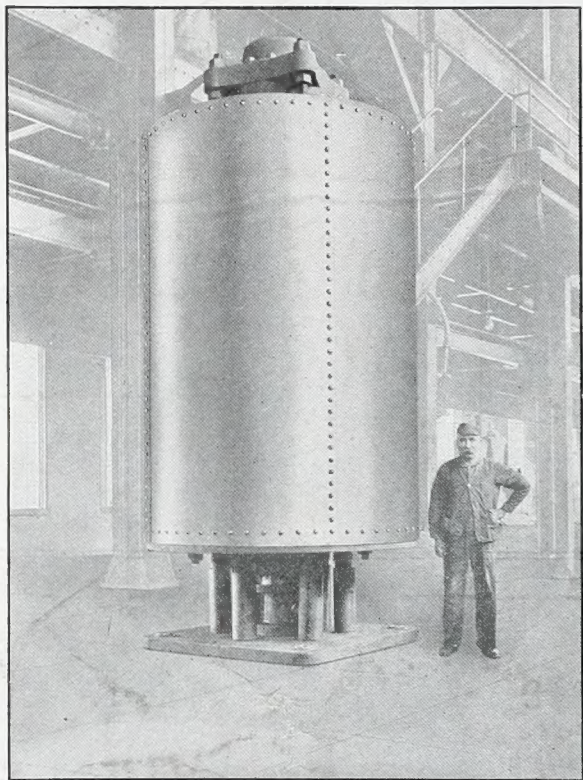
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ALL TYPES AND SIZES



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OUR LONG EXPERIENCE AND UNEQUALED FACILITIES ENABLE US TO GIVE YOU EFFICIENT SERVICE IN DESIGNING AND BUILDING THIS CLASS OF MACHINERY.

Hydraulic Presses for Piercing, Drawing, Forging, Cupping, etc.

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